THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

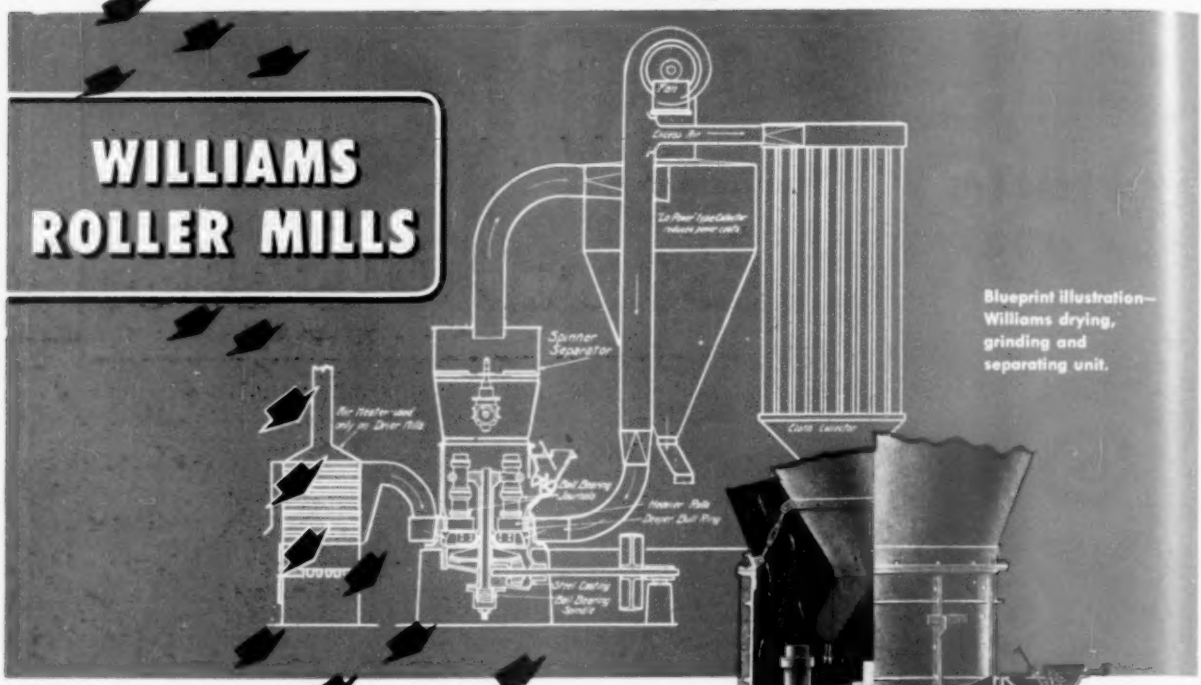
LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

NOVEMBER
1951

Gravel pumping dredge at Consumers Sand and Gravel Co., Kalamazoo, Mich.

For those Fine Grinding Jobs . . .

WILLIAMS ROLLER MILLS



Blueprint illustration—Williams drying, grinding and separating unit.

let's look at the record

LIMESTONE

Many Williams Roller Mills are satisfactorily grinding limestone to 99% 325 mesh or 85% 200 mesh and for all other commercial uses finer than 40 mesh.

LIME

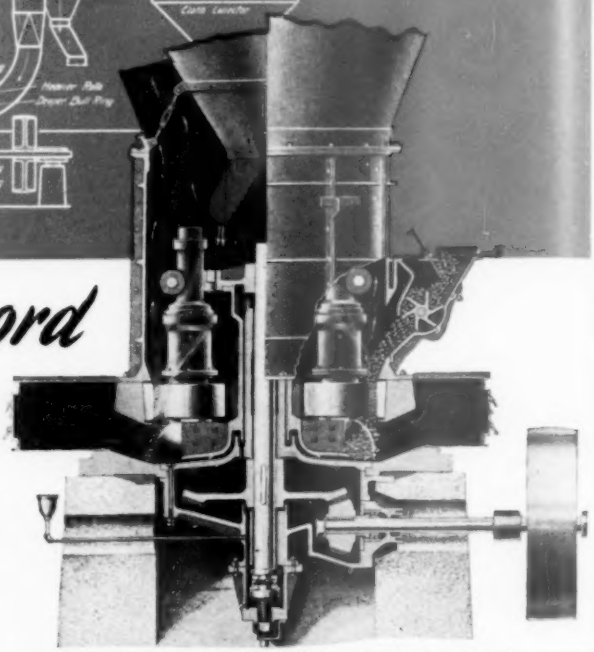
Both burned and hydrated lime can be satisfactorily processed in Williams Roller or Impact Mills. Automatic throw-out rejects impurities and unburned cores. Dustless operation.

CLAYS, TALC, KAOLIN

Can be reduced to any fineness from 40 mesh to micron sizes. Impurities removed by automatic throw-out.

DRY AND GRIND SIMULTANEOUSLY

Simply by introducing hot air, all sizes dry as they grind eliminating the need of separate drying equipment.



Sectional view of Roller Mill showing how material is ground between rolls and bull ring, then air swept to Separator which extracts fines and returns oversize for re-grinding.

WILLIAMS ALSO MAKES . . .

Heavy-duty hammermills for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "packaged" crushing and grinding plants.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
800 ST. LOUIS AVENUE ☆ ST. LOUIS 6, MO.

WC49-11P9

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

No ONE chain serves every purpose

LINK-BELT offers a SPECIFIC chain

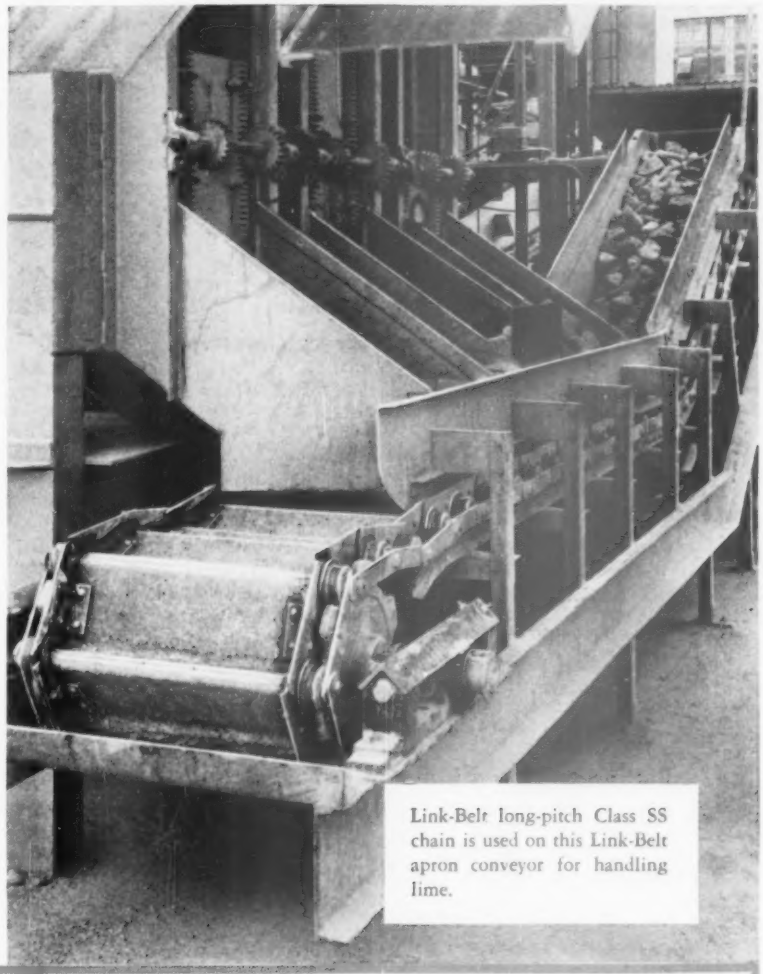
. . . to match your SPECIALIZED needs

There's just *one* type of chain that *best* meets the requirements of any given job. And no "general purpose" chain can do it as well. From the world's most complete chain line, Link-Belt engineers can recommend the *right* chain for your requirements. Large or small, Link-Belt builds them all.

Get longer life!

Remember, too — when you see a chain with the Link-Belt trademark, you can be sure it's made to the highest standards. Link-Belt's modern plant facilities assure greater refinements of manufacture. Exact control of materials and processes gives increased uniformity . . . longer chain life.

12,325-D



Link-Belt long-pitch Class SS chain is used on this Link-Belt apron conveyor for handling lime.

TYPICAL CHAINS from the COMPLETE LINK-BELT line

Class SS bushed roller chain with offset sidebars —for heavy drive service at moderate speeds.

Class SS bushed roller chain with straight sidebars —for practically any conveying or elevating service.

Class 800 ley bushed chain—for heavy duty, severely abrasive conveying and elevating.

Class C combination chain — popular, durable, low cost design for elevators, conveyors.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, factory branch stores and distributors in principal cities.

LINK-BELT

CHAINS AND SPROCKETS

ROCK PRODUCTS

NOVEMBER, 1951 THE I

Bror Nordberg
Editor

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ROCK PRODUCTS is indexed regularly by Engineering Index, Inc. and the Industrial Arts Index.

SUBSCRIPTION INFORMATION

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November, 1951

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seven months of 1951, amounted to 61,200,000 net tons, or an annual rate of 105,000,000 tons. With a rated capacity of 104,200,000 tons, the steel industry has averaged better than 100 percent of its production rate. Steel production in the second half of 1950 averaged 98 percent of capacity and 96 percent during the first six months of that year.

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A new clay cement, designed to close off permeable zones met in oil-drilling operations, has been developed by Magnolia Petroleum Co., affiliate of Socony-Vacuum Oil Co., in an effort to offset the financial losses sustained when expensive drilling muds are lost to these porous areas.

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VOL. 54, No. 11

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

This Month

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"WE HEAR..."

November, 1951

According to an announcement by the American Association of State Highway Officials, critical shortages of steel are seriously threatening the nation's road program. It was asserted that neither N.P.A. nor D.P.A. has a comprehensive appreciation of the highway problem. Fourth quarter steel allotments for state, county and city use have been cut from 300,000 to 250,000 tons. Since large amounts of steel were made available to other industries well in advance of announcements of steel allocations for highways for the fourth quarter, it is feared that it may result in the steel mills being too loaded to consider highway steel during this period. The association states that the matter should be given strong and immediate attention.

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A total of $10.7 billion for engineering construction of all classes for the first 39 weeks of 1951 was 20 percent higher than corresponding contract awards for the same period last year, as reported by Engineering News-Record. Industrial building awards showed a 179 percent increase, reaching a total of over $3.1 billion--the largest increase reported in any classification. Total contracts for public construction, including federal, state and municipal, totaled slightly over $5 billion, or an increase of 36 percent over the same period for 1950. Public housing awards were 144 percent higher than the 1950 figures, while private housing decreased 45 percent. Commercial buildings decreased 33 percent.

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At a Pacific Coast sand and gravel plant a 9-year old child died of suffocation while playing in a large sand hopper. The parents have filed a $100,654 suit against the company, charging that the company failed to provide guards or adequate fencing. Suits of this nature are on the increase.

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A large steel company, in its 1950 annual report, voiced its concern over the U.S. tax situation and the terrific impact of the cost of government on the American economy. Its taxes for 1950--federal, state and local--amounted to $68,546,069, which was over $10,000,000 more than its net earnings of $57,814,974. This compares with $43,500,000 taxes in 1949 as against a $39,300,000 net income: in 1948, $39,100,000 taxes as against $40,100,000 net income. Taxes in 1950 were equal to 12.76 percent of sales, compared with net earnings equal to 10.77 percent of sales. They amounted to $9.31 per share of stock, compared with earnings of $7.85 per share: to $2310 per employe, compared to $1554 per employe in 1949.

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Production of steel ingots and castings, in the first seven months of 1951, amounted to 61,200,000 net tons, or an annual rate of 105,000,000 tons. With a rated capacity of 104,200,000 tons, the steel industry has averaged better than 100 percent of its production rate. Steel production in the second half of 1950 averaged 98 percent of capacity and 96 percent during the first six months of that year.

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A slope belt-conveyor system is to be installed in an iron mine beneath the floor of the Atlantic Ocean--1600 ft. below sea level and three miles off the shore of Bell Island, Newfoundland. The new 1700-ft. high lift belt system, said to be the world's largest and highest, is expected to increase production at the mine by at least 200 percent. The installation is being made by Dominion Steel and Coal Co.

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THE EDITORS

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Bror Nordberg

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* * * * * * * * *

What is claimed to be the world's largest underground commercial storage project is being undertaken at the Loring quarries, Bonner Springs, Kan., according to a recent newspaper report. The proposed storage area is expected to cost approximately $1,000,000 and is being hollowed out of a 100-ft. high limestone bluff on a 40-acre tract at the site of the quarries. About 11 acres have been mined out and the balance is scheduled for completion early in 1952. It is presumed that perishables including foods, among other commodities, will be stored underground.

* * * * * * * * *

Construction in August, 1951, in the 37 states east of the Rockies totaled $1,262,811,000, which was an 8 percent decrease from the preceding month, and 18 percent lower than in August, 1950, according to an F. W. Dodge Corp. report. Nonresidential awards in August, 1951, were $475,957,000, or 11 percent below July and 12 percent lower than in August, 1950. Residential contracts of $567,566,000 were 4 percent higher than July, but 25 percent lower than August a year ago. Public and private works and utilities were 26 percent less than July and 14 percent below August, 1950. The large construction volume piled up in the early months of this year is keeping 1951 on top as a record building year. The eight-month total of $11,450,750,000 is pressing closely the $14,500,000,000 total for the entire year of 1950.

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Bureau of Mines engineers have developed a new gas-combustion retorting process which has an excellent chance of producing crude shale oil at a cost competitive with natural petroleum, according to a Chemical Engineering report. The Bureau of Mines has awarded a $333,800 contract for the design and construction of a demonstration-scale retort at Rifle, Colo., which is expected to be in operation by mid-1952. Any large-scale development to recover oil from shale will have, as a by-product, vast tonnages of material possibly available for aggregates.

* * * * * * * * *

It has been predicted by the U. S. Public Health Service that approximately $12 billion will have to be spent in the next ten years to construct an estimated 6600 additional municipal sewage treatment plants and about 3500 more industrial waste plants, in order to abate pollution of industrial and domestic water sources of the nation. It was also revealed that there are more than 22,000 sources of water pollution in the country, of which almost half represent independent plant waste outlets. The wastes are treated in 2595 of these installations; 3659 are not treated, and the remaining plants made no report on their treatment facilities.

* * * * * * * * *

The proposed Delaware River Extension of the Pennsylvania Turnpike System to link Pennsylvania with New Jersey was recently approved by the Pennsylvania state administration. Aerial and traffic surveys are being conducted to determine the best route to connect the two turnpikes somewhere between Morrisville and Philadelphia. A bridge will be constructed over the river at the site selected.

* * * * * * * * *

The application of lignite as fuel to conserve natural gas is being pioneered by Aluminum Co. of America in its plans for an $80,000,000 (170,000,000 lb. capacity) aluminum plant in Milam County, Texas, south of Waco. Texas Power & Light Co. will build and operate lignite-using power facilities, obtaining lignite by the strip and slope mining of large deposits nearby. Although Texas possesses an estimated 23 billion tons of lignite deposits, it has heretofore made little industrial use of it. In 1945, it was estimated that with gas at 15 cents per 1000 cu. ft. and lignite at $2 per ton (on a delivered basis), cost of 1000 lb. of steam would be 17.1 and 20.5 cents, respectively, with furnace efficiencies at 85 and 65 percents.

THE EDITORS

★ ★ Editor's Page

Requirements for an Adequate National Highway System

WE HAVE NOW LOST some ten years of highway construction because of emergency restrictions and our present emergency could well result, for all practical purposes, in complete destruction of the existing network of highways.

Those in high office who are placing obstacles in the way of a realistic highway-building program must have their attitudes toward a truly urgent need for better highways changed completely. We cannot continue to restrict the minimum necessary flow of steel to road builders, nor permit a policy of just "maintenance" of our traffic arteries to be accepted as sufficient for the immediate years ahead.

There is no doubt that a long out-dated highway system is declining at an extraordinary rate under the impact of record-breaking traffic demands; neither should there be any question but what this is retarding our economic progress and that it is a threat to our security in event of national emergency. Some 75 percent of all freight is moved on rubber tires over the highways and it is important that that continue to be so.

It is probably true, as the Maryland road tests for durability of pavement indicate, that overloaded trucks have hastened the deterioration of highways, and the trucking industry is being severely criticized for it. However, enforcement of wheel-load limitations is not the permanent answer.

Most of the main highways were built 20 or more years ago when the commercial use to which they later were to be subjected wasn't even anticipated. That fact isn't fully appreciated by an apathetic public which has lost faith in highway building because the then-called "permanent" roads gave out too soon.

The point is that we have the trucks, about 8,000,000 of them, and they are here to stay so the only solution is to build highways that will be adequate for trucks and to accommodate automobile traffic with safety. Such roads can be designed and built provided the public shows it wants them and applies effective pressure on its elected officials.

Must Arouse the Public

It is an extremely important contribution that big concerns like Ford, General Motors, Goodrich, Firestone and Goodyear are sponsoring institutional advertising and having top officials make speeches to bring the facts of the highway picture home to the public. No political considerations are involved; instead, these messages are bringing out economic and engineering facts that all taxpayers should know about their highways. They strongly oppose diversion of highway funds to other uses, and present evidence to warrant undertaking a program that might cost four to six billion dollars annually for the next ten years.

Emphasis is given to a need for highways that will be designed to withstand modern loadings and speeds. Such designs would require not only wider and thicker pavement surfaces but heavier roadbeds to withstand greater loads, better drainage and other engineering features to minimize deterioration from freezing and thawing.

Requirements for Aggregates

Recent evidence has proved that lack of suitable subbases has contributed to pumping at pavement joints and cracks, in fills as well as in cuts, under the impact of increasing wheel loads and heavy traffic density. Highway engineers now recognize that modern highway pavements can not be placed on the mud but must be supported by "ballast" like the railroads.

It is important to the aggregates industries that the materials used for subbases must be specially processed. They must be graded so that they will compact well, and they must have the granularity required for adequate drainage and yet prevent the subsoil from coming up through.

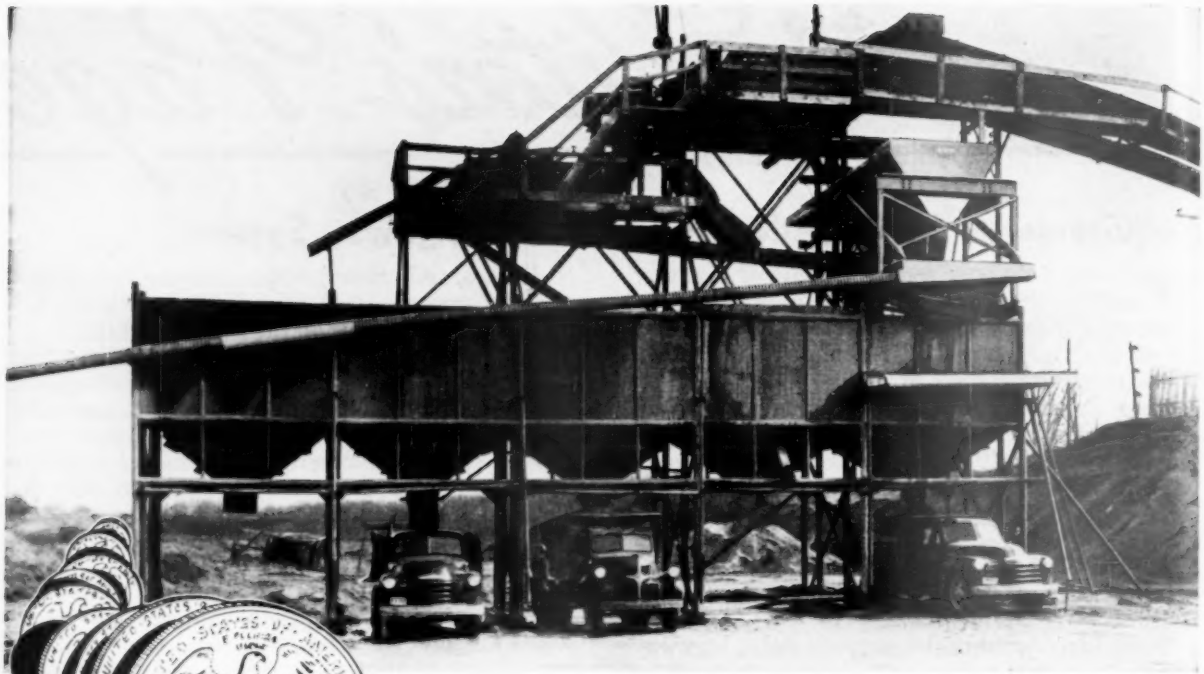
The demand for graded granular materials for highway construction is growing rapidly and is bound to constitute an enormous market for all types of aggregates from established producers in the years to come.

Toll roads now being built or under consideration indicate the trend toward subbases, some as thick as 48 in. to resist frost-heaving. The New Jersey turnpike has a bituminous wearing surface and is designed for 36,000-lb. axle loads. There will be up to 42 in. thickness of materials including 28 in. of selected granular "frost-free" material (crushed stone) for the tops of all embankments and fills.

The projected Ohio turnpike will be of 10 in. portland cement concrete laid on suitable subbase. In Oklahoma, a toll road is planned for 28,000-lb. axle loads and is expected to last 40 years. Regardless of the type of surfacing there will be more than a foot of subbase.

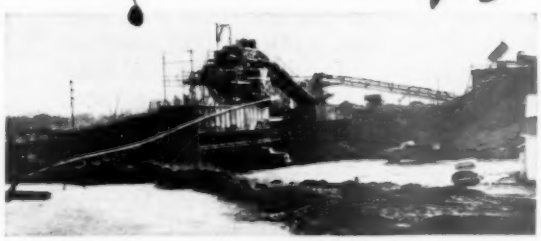
Roads like these are costly but they will endure. It would be far more economical to start a similar public system *now* than to waste funds for patching purposes on inadequate highways as Washington would have us continue to do.

Bror Nordberg



Ever hear Eagles Sing?

IT SOUNDS like a cash register symphony. A couple of Eagles are singing at the plant of Quillin Bros., Lodi, Ohio, shown here. Material from the bottom deck of screen is chuted to an Eagle Water Scalping Tank which concentrates solids and scalps off excess water. The concentrated material is bled to an Eagle Washer - Classifier - Dehydrator, directly below. Adjustable U-shaped weirs enables Quillin Bros. to retain the mesh they want when they want it. Any contamination in sand is washed away. Material goes to bins with excess moisture removed. Cost per yard for processing this premium material is figured in cents. If your profit picture isn't what it should be let Eagles sing for you! Ask for Catalog 47 Water Scalping Tanks.



EAGLE BREAKER BALLS --- handy around the quarry or pit

Made of a tough, special, semi-steel. For breaking man-size rock down to crusher size, knocking down banks, breaking up scrap or concrete. Replaceable hooks. Four standard sizes: 1500 lb., 2000 lb., 3000 lb., 4000 lb. Also special sizes. Ask for Bulletin 950.

EAGLE IRON WORKS

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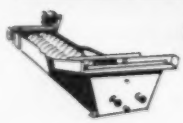
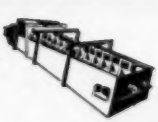
Des Moines, Iowa


Screw Washers


Log Washers

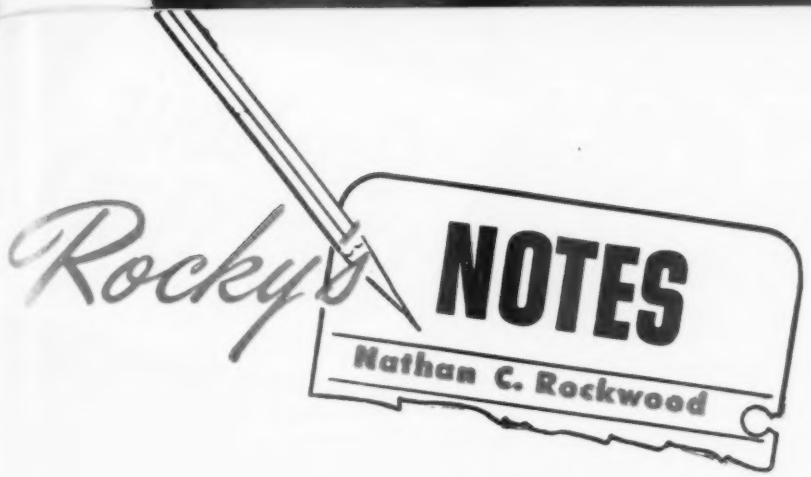

"Swintek" Dredge Ladders


Clay Crushers


Clay and Cinder Grinders


Shale Planers


Coal Crackers



Headed for Endless Inflation Controls?

A SPEAKER BEFORE a select group of construction material producers, a man whom we all know and respect as probably the best informed in Washington on government policies and developments, stated in something like these words: "The present price, material and wage controls are with us to stay for a long, long time, regardless of a possible change in the national administration. The only way they will ever be gotten rid of is by an Act of Congress." The inference was that there is now an intrenched bureaucracy, which *any* subsequent administration will find it difficult to get rid of. Also, there is another angle, which the speaker did not mention; that is, it would seem that a majority of the American public, and that includes many business men as well as organized labor, appears to be sold on the idea that price, and/or wage controls, at least, are necessary.

The surprising thing is that so many intelligent people are unable to grasp the real causes of inflation or are unwilling to press toward its cure. It *will* take a very courageous administration and congress, and the longer we wait the greater will be the problem, the evils, and the more courage it will take. Even such top-notch business men as Charles E. Wilson, head of our mobilization program, appear to believe that government controls can keep the progress of inflation within bounds. But men better informed on monetary matters than Mr. Wilson point out a fundamental fallacy. His reliance on controls apparently is based on the theory that rising prices and wages, or their tendency to rise, constitute inflation. Mr. Wilson says he does not like price control in principle, but that he sees no other way of dealing with inflation that now exists and threatens to increase.

Could At Least Be Frank

It may easily be that Mr. Wilson, in a position as he is to see the inside workings of a political machine, despairs of getting any other kind of help from politicians, whose chief aim is to be reëlected, but he could use the prominence of his position to drive home to every one of us some fundamentals that are available from a few genuine economists, who do understand the workings of monetary policies. To apply correct monetary policies to cure present inflationary tendencies would indeed be painful to many sections of the public; and politicians are hardly likely to suggest it, but with sufficient public understanding and pressure behind it, politicians and statesmen could be compelled to face the issue squarely and honestly.

The federal government is different from an individual or a business enterprise that spends beyond its income only in one respect. It can pay its debts by practically limitless issue of "I.O.U.'s." If these "I.O.U.'s" are greenbacks or currency they add directly to the public's money supply. If they are bonds, they are readily convertible into credit or currency at the option of the holder. If they are the kind of bonds or notes taken by the banks, they form part of the reserves upon which the banks can issue credit in addition to the face value of the bonds; and of course bank credit is the most used form of money.

Since about 1933 when our currency went off the gold standard, we have had a politically managed monetary system in which the supply of money has little relation to ordinary commodity supply and demand. Much of the "money" which still exists either as currency or debt was spent for materials and services, which, economically at least, represent waste and destruction. The requirements of the average person for the necessities and available luxuries of life have not changed greatly, but the money in hand for many people to purchase these has increased in proportion to the federal government's spending or accumulation of debt. The intrinsic value of a family's requirements is no greater than it was in 1940, but its "money rating" is almost twice as great because there is about twice as much paper money of one kind or another.

Return to Stable Dollar

Since inflation can be halted for any length of time only by limiting the amount of money and credit, price and wage controls can never do more than arrest the progress of inflation temporarily. Of course, that is quite evident from experience in this one year of 1951 alone. Wages of union labor have been advanced "to keep pace with the increase in the cost of living," but prices were advancing only to keep up with previous wage increases. The next move will be for prices to advance to keep up with the latest wage advances. Such a process is interminable; the dollar becomes less and less valuable as a medium of exchange, and since labor is the chief commodity for exchange, it becomes more and more high priced in terms of dollars. As long as labor and producers or manufacturers can keep wages and prices in somewhat the same relationship, the majority appears not to worry too much. "What difference does it make how much a dollar buys if we get proportionately more of them?"

That, of course, is an extremely shortsighted view. Endless inflation, however "controlled," even though its progress be slow, can end only in worthless paper money, which will eventually require drastic monetary measures, such as a capital levy, or the wiping out of all present paper currency and other evidences of debt and the substitution of a revalued currency, which will wipe out the greater part of savings and capital values.

A Proposed Solution

It is not control of prices and wages that is needed. This may slow the progress of inflation, but it will not stop it. Those who seriously study the situation with some understanding of monetary principles can hardly help agreeing with an editorial in the *Wall Street Journal* of September 19, answering Mr. Wilson's arguments, which concluded as follows:

"Since inflation is a monetary matter, then nothing at all in the way of a 'control' in non-monetary fields can be applied as a remedy. Indeed, it ought to be clear that 'control' is not the desired word. What we want is 'prevention,' or, failing that, the ending of inflation.

"In our opinion, the thing to do about inflation is not to have it. Or anyway, not to have any more of it.

"This is not an impossible task; and although it may be politically difficult, that is nothing beside the impossibility of Mr. Wilson's way. All that is necessary is a conscientious national effort by the administration to stop financing Treasury deficits by pumping government securities into the banking system.

"We certainly agree with Mr. Wilson that inflation 'is an enemy possibly even more dangerous than Russia.' But it is an enemy that can be quickly conquered. If the government will stop inflating the money supply, there will simply no longer be a problem of controlling the runaway prices which Mr. Wilson calls inflation."

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EUCLIDS

LABOR RELATIONS TRENDS

Another Agricultural Limestone Producer Penalized Under Public Contracts Act—Highway Materials Not Under Wage and Hour Law

By NATHAN C. ROCKWOOD

ON THIS PAGE in our May, 1951, issue we reported a case of the U. S. Department of Labor penalizing an agricultural limestone producer who had agreed to deliver unspecified amounts at a certain price to farmers on orders under the Agricultural Conservation Program of the Department of Agriculture. The amount actually delivered under the orders amounted to less than $10,000; nevertheless the Labor Department held that did not exempt the producer from the requirements of the Walsh-Healey Public Contracts Act, among which is that time-and-a-half must be paid for all time over 8 hr. in any one day regardless of the number of hours in the work week.

We now have a similar case in a ruling of the Public Contracts Division of the Labor Department against the Richland Lime Co. of Tennessee. This case covers some points not brought out in the previous one, including alleged violation of another provision of the Walsh-Healey Act, which requires contractors furnishing materials to the federal government to maintain certain standards of safety and sanitation, with the necessary facilities. In this case the limestone producer was held responsible for not satisfying this requirement since it was claimed he had provided no washroom or toilet facilities, no first-aid facilities, no supply of drinking water, and no fire-extinguishing equipment of any type. Those requirements, in whole or in part, are probably often overlooked by small quarry operators, especially those operating temporary or portable plants.

Examiner's Findings

The case against the producer (the respondent) was stated as follows: (1) "He failed to pay employes the overtime rate of time-and-one-half their basic hourly rates for hours worked in excess of eight per day and 40 per week, (2) failed to keep and maintain adequate wage and hour records for each employe and, with respect to certain employes, kept a false record of the hours worked for each workday and work week, and (3) caused and permitted employes to work in surroundings and under conditions which were unsanitary, hazardous and dangerous to their health and safety."

The contentions of the respondent were: (1) "That the Act did not apply to the contract; (2) that if the Act applied at all to performance of the contract, it applied during a period less extended than that claimed by the government and (3) that the Act, if applicable at all, applied to considerably fewer employes than the government claims were covered by its provisions."

In this instance the invitation to bid of the Department of Agriculture contained a clause relating to compliance with the Walsh-Healey Public Contracts Act provided the contract exceeded $10,000. The notice from the government, accepting a bid of $2.65 per ton delivered in the farmer's yard and $3.25 spread on his fields (December 1947) stated specifically that "the contract was not limited to $10,000."

Under this contract, between March 9, and September 25, 1948, the Richland Lime Co. sold 1863 tons worth $6,006.15 delivered. At this time the ownership of the company changed and the Cedar Grove Lime Co. took over and made deliveries up to the end of the year, when the contract expired, of 689 tons at a total price of $2,203.25. In all the two operators furnished 2552 tons for $8,209.40.

Using the same arguments as in the previous case, which we reported in the May issue, the Labor Department hearing examiner held that the contract came under the law in spite of the fact that the sum involved was thus appreciably less than $10,000.

Absence of Records

Like other agricultural limestone producers, this one had considerably more business than his government orders, but he neglected to keep accurate records of which employes and how long they worked exclusively filling government orders and how much and who on other orders. As a result the government investigators made more or less arbitrary decisions on when the work on the contract began and which employes were under the Act. For example, although the first delivery of limestone under the contract was not made until March 9, the Labor Department investigator held that the employes began work under the contract when a screen was received by the producer on February 10, as this "was necessary for use in fulfilling the contract." However, he was overruled in this by the hearing examiner, and the week ending March 12 was accepted as the first under the contract. There was one week in which no deliveries were made under the contract, and this week was also omitted from the calculations.

The producer claimed that 14 of his employes, of whom 11 were truck drivers, did not work under the government contract; that most of the deliveries were made by a contract carrier operating two spreader trucks. However, he was not able to prove that his other truck drivers, whose work also included hauling from quarry to crushing plant, as well as numerous "odd jobs," did not make some farm deliveries in dump trucks. Indeed the producer's sales and delivery slips were used as evidence against him on this point.

However, the hearing examiner did not accuse the producer of misrepresentation, he said: "Without any reflection on the sincerity with which the respondent testified, the fact that most of his time was spent at another place of business materially affects the weight of his testimony insofar as it may be regarded as doing more than describing in a general way, the work of the individual employes. It was by reason of this fact that respondent candidly admitted that beyond knowing what a man was hired for and was expected to do, he did not know of his own personal knowledge exactly what an employe did when he was not there; he could add nothing to the information shown in his books, which were his only guide."

Employes Included

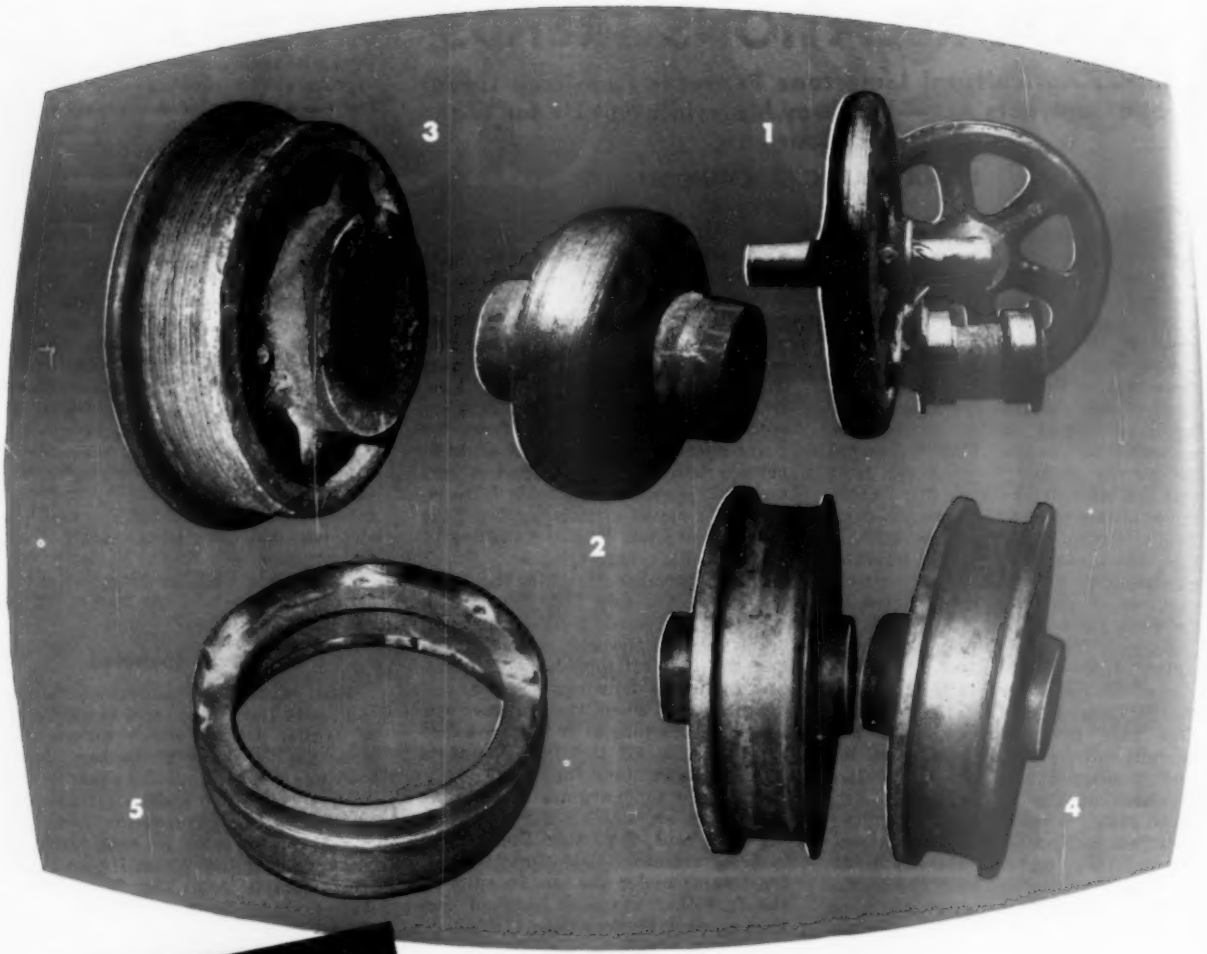
The hearing examiner concluded that, with the exception of two drivers of trailer trucks which apparently were used exclusively to haul from bins to stockpiles, all the other truck drivers must have made some deliveries under the government contract, and therefore must be considered as coming under the Walsh-Healey Public Contracts Act. The two drivers were excluded because it could not be proved that any deliveries were made on government orders from the stockpiles.

The only employes besides these two truck drivers excluded from the coverage of the Act were two maintenance men. On their cases the hearing examiner ruled: "Both were mechanics employed mainly in the garage or repair shop in the repair of trucks; they performed some minor emergency repair work on trucks and occasionally helped in the repair of other equipment outside the shop. Maintenance men and repair-shop crews have been interpreted by the Department of Labor to be without the purview of the Act. The evidence does not justify any different classification or treatment of these two employes, and I accordingly consider them to be employes to whom the stipulations of the Act did not apply."

The producer was able to show from his production and sales records that in some weeks the amount of Government orders delivered did not amount to more than 5 percent of his total week's business. However, since he kept no records which segregated the time of his employes when they were or were not employed on government orders, the hearing examiner included every week in which any deliveries at all were made under the contract.

The producer claimed exemption for

(Continued on page 102)



1. SHOVEL IDLERS
Built up and hard-faced automatically with Stoody 105, this shovel idler and tractor roller are exceptionally smooth and long wearing.

2. SHOVEL ROLLS
Note the even deposit on this shovel roll. Stoody 105 will at least double its useful life—save hours of downtime.

3. MINE CAR WHEELS
Mine car wheels sustain heavy wear from track debris. Stoody 105 retains size and roundness—keeps wheels on the job under difficult conditions.

4. CRANE WHEELS
Here, unprotected and hard-faced crane wheels are compared. Note wear evident on flange of unprotected wheel, left. Stoody 105 has held size on wheel at right.

5. BRAKE DRUMS
Surface of this brake drum is automatically hard-faced with Stoody 105 and subsequently machined. Resulting smooth surface far outwears unprotected drum.

STOODY 105 keeps the wheels of industry turning . . .

with less wear—less down time—less cost

Everywhere you look—in almost any industry, you see wheels in use. Some work *in* earth, others operate metal against metal . . . *but almost all are subject to heavy abrasion, loss of size, loss of life!* The quick, sure way to reduce wear . . . to keep these wheels of industry rolling . . . to cut maintenance is to hard-face with STOODY 105! It's a time-tried, proven procedure that saves equipment and dollars and reduces the need for hard-to-get replacements.

See your Stoody Dealer—600 in U. S. and Canada—for friendly help, or write direct.

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the *Personal Side* of the news

Quarter-Century Members of Concrete Industry

MAURICE J. O'CONNOR and "CLEM" J. FREIN, both of Concrete, Inc., St. Louis, Mo., are celebrating their 25th anniversaries in the ready-mixed concrete industry. Mr. O'Connor started his career as a payroll clerk for General Materials Co., St. Louis, Mo., in 1926. He was soon placed in charge of the garage and, in a short time, transferred into sales, where he has been ever since. In 1948 the company was absorbed by Concrete, Inc., and he joined the sales force of the new firm. Mr. Frein, secretary-treasurer of Concrete, Inc., moved to St. Louis in 1925 when he went to work for Shell Oil Co. In 1926 he joined Fred Schmitt Contracting Co. as bookkeeper and cost accountant. The company operated a brick and reinforced concrete business and also a ready-mixed lime and mortar plant. In 1927, due to expanded operations, a separate company was organized for the general sale of ready-mixed concrete, and Mr. Frein was placed in charge as supervisor. In 1936 he became secretary-treasurer. Five years later the firm's name was changed to Concrete, Inc.

Works Managers

VERN COFFMAN, works manager of the Heath, Mont., plant of United States Gypsum Co., Chicago, Ill., has been appointed works manager of the lime plant near Toledo, Ohio. Harold Vogt, production engineer of mines and quarries, Oconomowoc, Wis., has been named to succeed Mr. Coffman as works manager at the Heath plant. Mr. Coffman was appointed quality superintendent at Heath, Mont., in 1941, and three years later was promoted to works manager. Mr. Vogt served as mine superintendent at the Heath plant in 1947 and 1948, prior to his appointment as production engineer. He is a graduate of the Missouri School of Mines and is a member of the American Institute of Mining and Metallurgical Engineers.

Named Vice-Presidents

RUSSELL P. MUMFORD has been appointed vice-president and general manager of The Beckley & Myers Co., concrete products manufacturer of Springfield, Ohio. Warren Brenner has been named vice-president and sales manager, and Robert Yoakum, superintendent.

Named Vice-President

ROBERT F. BLANKS, chief of the research and geology division of the Bureau of Reclamation, has joined the Ideal Cement Co., Denver, Colo., as vice-president and general manager of Great Western Aggregates, Inc., a wholly owned subsidiary. Mr. Blanks has a long record of experience and accomplishments in the fields of civil engineering, research and concrete design, and has been connected with the Bureau of Reclamation for many

Robert F. Blanks

years. Great Western Aggregates, Inc., was formed in 1950 by Ideal Cement Co. with the objective, through research, of studying aggregates for the purpose of obtaining a complete and thorough knowledge and understanding of aggregates of all types.

Joins Engineering Firm

MAJOR WILLIAM F. M. LONGWELL, formerly associate professor of civil engineering at Worcester Polytechnic Institute, has joined The Thompson and Lichtner Co., Inc., consulting engineers, Brookline, Mass., as structural analyst and principal assistant to Benjamin A. Lekesky, who was recently elected vice-president in charge of testing and inspection. Major Longwell was educated at West Point, State University of Iowa and Yale University. He served over 18 years with the U. S. Army, Corps of Engineers, and taught R.O.T.C. and civil engineering for 15 years. He will make his home at Newton Centre, Mass. Charles E. MacKinnon has been elected treasurer; and Henry A. Marbach has been named vice-president in charge of engineering. Other appointments include Arthur K. Warner as director of laboratories; George E. Landgren as soils engineer; Joseph A. McElroy as geologist; and Richard F. Battles as principal assistant to the vice-president in charge of engineering.

Appointed to NPA Branch

GEORGE M. HEBBARD of Bay Ridge, Md., has been appointed deputy chief of the Inorganic and Agricultural Chemicals Branch of the Chemicals Division of the National Production Authority, Washington, D. C. Mr. Hebbard is on leave as vice-president of operations and engineering of the Davison Chemical Corp., Baltimore, Md.

Heads Limestone Firm

H. B. BICKERS has been elected president of Limestone Products Co., Cleburne, Texas. Dr. George H. Anderson and W. T. George have been named vice-presidents, and Frederick Dickson, secretary-treasurer. W. W. Conley is chairman of the board.

Heads Sales Division

WILLIAM H. PULLEY has been appointed manager of the new Southeastern sales division of National Gypsum Co., Buffalo, N. Y., in addition to his duties as manager of the Atlanta district office. The new area, which includes the states of Florida, Georgia, North Carolina and South Carolina, has been divided into the Atlanta and Charlotte districts. James E. Kirkman has been named manager of the Charlotte district, which covers North Carolina and South Carolina. He was formerly assistant manager of the Atlanta district and will be succeeded in this position by W. William Smith, Jr., formerly sales supervisor.

Sales Manager

S. T. KEEL, sales manager of the Southern Phosphate Division of International Minerals and Chemical Corp., Chicago, Ill., has been appointed domestic phosphate sales manager.

Returns from Europe

PHIL PARK, vice-president of Besser Manufacturing Co., Alpena, Mich., who has made periodic trips to many foreign countries to supervise various overseas operations of the company, recently returned from a seven-week trip to France, England, Ireland and Holland, where he serviced concrete block machines making concrete products for the reconstruction of bombed areas. Mr. Park visited the International Trade Fairs in Holland, Germany, Italy and France, as well as the Festival of Britain, where he investigated concrete products machinery and new concrete products. He reported that the European machine is still far from being automatic or capable of producing a high quality product. A highlight of the trip was an audience with Pope Pius XII.

Heads Defense Committee

ROBERT MITCHELL, president of Consolidated Rock Products Co., Los Angeles, Calif., has been appointed by the governor of the state as chairman of its Defense Mobilization Service

Robert Mitchell

Committee. The committee's work is to consist of coordinating federal, state and local defense activities, including anticipated construction of housing, community facilities and services, as well as construction or expansion of military installations and defense plants. In other words, the committee under Mr. Mitchell's guidance proposes to establish a close working relationship between all federal and state agencies whose activities play a part in the national defense effort. Those who are familiar with the chaotic state of such agencies throughout a large part of the country can appreciate that Mr. Mitchell has accepted, as he always has, responsibility for a pretty large order.

Heads Testing Laboratory

ERNEST GOFORTH, chemical science instructor at Independence Junior College, Independence, Kan., has accepted the position as head of the testing laboratory of the National Gypsum Co., Buffalo, N. Y., which is operating the ordnance plant at Parsons, Kan.

Named Manager

EDWARD J. DUGAN has been named manager of the Chazy Lime and Stone Co., Chazy, N. Y. He was formerly associated with the Champlain Valley Lime Co., of Winooski.

Sales Manager

EDWARD J. NUNAN has been appointed materials engineer and sales manager for the New York area of Buffalo Slag Co., Inc., Federal Crushed Stone Corp., and Hornell Gravel Corp., Buffalo, N. Y. Henry F. Rath, formerly sales representative, has been promoted to sales manager for the Pennsylvania area, with headquarters in Erie. Frederick R. Schultz has been placed in charge of railroad sales, in addition to serving as traffic manager. Robert H. Rosche has been named assistant sales manager.

Named Superintendents

H. A. EDWALL, superintendent of the Fredonia, Kan., plant of Consolidated Cement Corp., Chicago, Ill., has been appointed superintendent of the Cement City, Mich., plant. W. O. Stuart, Jr., of Houston, Texas, has succeeded Mr. Edwall at Fredonia.

Heads Phosphate Department

MISS M. C. BOYLE has been president of Thomson Phosphate Co. since the death of its founder, George Thomson, in 1941. The company was recently purchased by International Minerals and Chemical Corp., Chicago, Ill., and Miss Boyle, long a customer of the corporation, is now a member of the firm and manager of the Thomson phosphate department. Thirty-one years ago, Miss Boyle and the late Mr. Thomson had the courage to start a business in fine ground phosphate for direct application to the soil at a time when little was known about its use and there were no salesmen available to sell it. Today the company sells its product, Four Leaf powdered rock phosphate, in 26 states through 500 dealers and employs a staff of 30 at the Chicago office. The success of this 31-year old business is due largely to education in selling rock phosphate, according to Miss Boyle, who is a pioneer in sales and advertising for the fertilizer industry.

Miss M. C. Boyle

Spokesman for Dam Objectors

C. E. BAXTER, JR., vice-president of the Batesville White Lime Co., Batesville, Ark., acted as master of ceremonies for the objectors to the proposed Wolf Bayou dam at a recent meeting in Washington with the Board of Army Engineers. A plea was made by representatives from the lime company, the Silica Sand Products Co., Guion, Ark., the Reynolds Mining Corp., and other interested parties to separate the Wolf Bayou dam from the rest of the White River Basin project and consider placing the dam at least 22 miles farther north. Mr. Baxter told the board that bauxite was essential to the defense program, but that limestone was necessary to processing. During World War II, he said, bauxite had to be shipped from Dutch Guiana, tying up shipping and naval craft.

Wayne C. Fletcher, executive director of the State Resources and Development Commission, told the board that the Wolf Bayou dam as now planned would wipe out the chemical limestone and silica industries essential to Arkansas economy as well as the nation's defense program.

Walter L. Rice, president of the Reynolds Mining Corp., said, "The proposed dam would render inaccessible the only deposits of metallurgical grade limestone of any consequence in this section of the South. We own a large limestone quarry which would be completely cut off from rail transportation if the Wolf Bayou dam were built at the location presently proposed.

"Over 400,000 tons of limestone per year are being supplied from this and a nearby quarry to our parent company, Reynolds Metals, for the processing of bauxite at the Hurricane Creek alumina plant near Bauxite. The United States' reserves of bauxite are confined almost wholly to a small area near Bauxite. They are very limited in quantity and rapidly decreasing in average quality. The amount of limestone required to process these low grade bauxites is inversely proportional to their quality."

Allen McReynolds of Carthage, attorney for the Silica Sand Products Co. of Guion, said his firm has spent 30 years in building up an industry that is now an essential part of Arkansas' economy. All this, he added, would be wiped out under the present plan.

The report must be approved by the board before any money can be appropriated. It will then go to the chief of Army Engineers and then to Congress.

On C. of C. Committee

FRANK E. MCCASLIN, president, Oregon Portland Cement Co., Portland, Ore., and William Wallace Mein, Jr., vice-president of Calaveras Cement Co., San Francisco, Calif., are members of the Minerals and Metals branch of the Natural Resources Committee of the United States Chamber of Commerce.

Receives Treasury Award

W. R. MCCLENDON, president of Halliburton Oil Well Cementing Co., Duncan, Okla., has received an award from the Treasury Department for "meritorious service" in the recent payroll savings bond drive. Mr. McClendon is vice-president of the state board for the payroll savings plan. The award was presented by Vernon C. Clark assistant to Treasury Secretary John W. Snyder.

Commodity Manager

DAVID G. STENBERG, Chicago district manager for National Gypsum Co., Buffalo, N. Y., has been appointed general commodity manager, succeeding James J. Ryan. John C. Calhoun, formerly assistant manager of Pittsburgh district sales, has assumed Mr. Stenberg's position in Chicago. Mr. Stenberg, who has been with the firm for 12 years, was a salesman at Pittsburgh, Rochester and Buffalo before he became manager of Detroit district sales in 1946. He has been manager of the Chicago district for two years.

OBITUARIES

CHESTER A. FULTON, retired president of the Southern Phosphate Corp., Baltimore, Md., and former president of American Institute of Mining and Metallurgical Engineers, died on August 16. He was 68 years old. Mr. Fulton was born in Brooklyn, N. Y., and graduated with the degree of engineer of mines in 1906. After graduation he was employed by the Standard Smelting Co., Rapid City, S. D., as assayer and chemist. He later joined the Peregrina Mining and Milling Co., in Mexico, eventually becoming mine superintendent. In 1914 Mr. Fulton went to Venezuela as superintendent of the Lo Increible mine. He then spent two years in Cuba working on copper mines and in 1918 was manager of the Davison Sulphur Co., Cienfuegos, Cuba. Returning to the United States, he was consulting engineer for the Davison Chemical Corp., Baltimore, Md., for seven years. In 1928 he became vice-president of the Southern Phosphate Corp., and president in 1932, retiring in 1945. Mr. Fulton served on several committees of the A.I.M.E. and in 1944 was elected president. He was the author of several technical papers on the phosphate rock industry.

ANDREW LUNDTEIGEN, former vice-president of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., died September 23 after a long illness. He was 89 years old. Mr. Lundteigen joined the company in 1910 as managing engineer and in 1915 was elected a director. He became vice-president in 1928. He retired five years ago. Born in Darbu, Norway, Mr. Lundteigen studied chemistry at the National University in Oslo and came to the United States in 1887. His first job was in the office of an analytical chemist in Milwaukee. He started his career in the cement industry in 1889, when he became chief chemist of a portland cement plant at Yankton, S. D. In 1893 he was sent abroad to study cement plants in England, Germany and the Scandinavian countries. He was appointed chief chemist of the Peerless Portland Cement Co., Union City, Mich., in 1900, and two years later he became superintendent.

Andrew Lundteigen

SEELY B. PATTERSON, president of the Calcite Quarry Corp., Lebanon, Penn., passed away recently at the age of 66. Born in Quinnimount, W. Va., Mr. Patterson attended Phillipsburg Academy, Columbia University, and the Colorado School of Mines, where he received his E.M. degree in 1906. He was employed by the Robesonia Iron Co., the Spanish American Iron Co., in Cuba, the Anaconda Copper Mining Co., and Calumet and Arizona Copper Co. He returned to the Spanish American Iron Co. as general manager and then became assistant general manager of Cuban operations for Bethlehem Steel Co. He became associated with the Calcite Quarry Corp. as general manager in 1920, remaining there for 31 years, the last five of which he served as president.

HOWARD R. STALEY, construction engineer with the Atomic Energy Commission, Washington, D. C., died in his office on August 23. He was 51 years old. Mr. Staley attended the University of Iowa and received his M.S. degree at Massachusetts Institute of Technology, where he was professor of engineering for 15 years. While at M.I.T. he did much research work on lime for the National Lime Association. He was also a member of Committee C-7 on Lime of the American Society for Testing Materials.

ISAAC WALTER BIBLER, partner with his son, Adrian, in the Bibler Burial Vault Co., Marion, Ohio, died August 31 at the age of 67. A native of Grand Prairie, Mr. Bibler, with his cousin, Harvey Peters, established the Bibler Burial Vault Co. in 1930. Later his son purchased Mr. Peters' interest and became a partner in the business with his father.

NATHAN C. JOHNSON, consulting engineer, and one of the pioneers in improving the quality of portland cement concrete, passed away at Englewood, N. J., on August 26. Mr. Johnson graduated from Cornell University in 1906 as a mechanical engineer and soon entered the building construction field. He joined the Raymond Concrete Pile Co. as engineer of tests in 1913, during which time he developed a special interest in concrete. At that time he wrote a series of articles for *Engineering News-Record* on the use of the microscope as an aid to proportioning concrete for strength, and the effect of sand on the quality of concrete. He was also co-author with George A. Hool of the "Handbook of Building Construction," which was published in 1929, and at one time was a contributor to ROCK PRODUCTS. Mr. Johnson left the Raymond Concrete Pile Co. in 1915 to go into consulting work.

HUGH HADDOW, JR., founder and former vice-president and general manager of the Minantico Sand and Gravel Co., Millville, N. J., died September 18 at the age of 76. A native of Glasgow, Scotland, Mr. Haddow came to the United States as a boy and was graduated from Rutgers University in 1897. He retired several years ago.

WILLIAM J. JOHNSTON, chief chemist of Coplay Cement Manufacturing Co., Coplay, Penn., for the past 31 years, passed away October 16. He was 63 years old. Mr. Johnston joined the company in 1900 as an errand boy at the age of 12, and rose successively to laboratory employe and assistant chemist. In 1920 he was appointed chief chemist. Mr. Johnston was a director of the Lehigh County Agricultural Society, Lehigh National Bank of Catasauqua, and the Lehigh Valley Motor Club.

"AT HUNGRY HORSE ONLY 6 TEXACO PRODUCTS HANDLED ALL OUR MAJOR LUBRICATION"

BUILDING HUNGRY HORSE DAM, HUNGRY HORSE, MONTANA: Equipment used included 24 Diesel-powered Euclids, each of which has logged a quarter-million miles on this assignment; 9 Caterpillar tractors; 5 Northwest shovels; 27 International Harvester trucks; 8 Reo 55-passenger buses—plus numerous Chicago Pneumatic and Gardner-Denver air compressors and Chicago Pneumatic rock drills, as well as 2 Lidgerwood Cableways and 2 Washington Cableways.

General-Shea-Morrison Company, Contractor, Hungry Horse Dam, Hungry Horse, Montana, says—

"The time and confusion saved by the Texaco Simplified Lubrication Plan are incalculable."

"Not only is it more economical to use a small number of lubricants," says General-Shea-Morrison Company, "but there is little chance of error in application. The Texaco Lubricants used at Hungry Horse Dam were a big factor in keeping our equipment on the job and keeping our maintenance costs low."

Products Used in Texaco Simplified Lubrication Plan

1. ENGINE LUBRICATION: Use *Texaco Ursa Oil X★★*. Fully detergent-dispersive, keeps heavy-duty gasoline and Diesel engines clean, keeps harmful deposits from forming, guards against wear, rust, corrosion. Reduces maintenance costs and fuel consumption. **2. CHASSIS LUBRICATION:** Use *Texaco Marfak*. It's tough, longer lasting. Won't jar or squeeze out, protects against dirt, rust, wear. *More than 400 million pounds sold.* **3. WHEEL BEARING LUBRICATION:** Use *Texaco Marfak Heavy Duty*. Seals out dirt and moisture, seals itself in, assuring longer bearing life, safer braking. No seasonal change required. **4. CRAWLER TRACK LUBRICATION:** Use *Texaco Track Roll Lubricant*. Gives long-lasting protection against dirt, water, wear. Reduces maintenance costs. **5. AIR COMPRESSOR LUBRICATION:** Use recommended Texaco air compressor oils. There is one exactly suited to your operating conditions. **6. ROCK DRILL LUBRICATION:** Use *Texaco Rock Drill Lubricant EP*. "Extreme pressure" properties give superior protection against wear. Guard against rust whether drills are running or idle.

Follow the Texaco Simplified Lubrication Plan for greater savings and convenience. A Texaco Lubrication Engineer will gladly help you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants and Fuels

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

INDUSTRY *News*

Clay dredging vessel, owned by Caribbean Cement Co., Ltd., was run aground during recent Jamaica hurricane; ship was undamaged and only slight damage was done to cement plant

Agstone Associations Completing Merger

AFTER SEVERAL YEARS OF NEGOTIATIONS, special committees of the National Agricultural Limestone Association and the Agricultural Limestone Institute have accomplished objectives towards the merger of the two associations into one national organization representing the industry.

The committees have made the following recommendations:

1. The new organization will be called the National Agricultural Limestone Institute, to be established as of January 1, 1952.

2. The new organization will be incorporated and be operated under bylaws recently drafted by a special subcommittee.

3. The two ten-man committees will proceed with the incorporation and will serve as the board of directors until the first annual convention which will be held in Washington, January 15-17, 1952. For the first year, there will be 60 directors as provided for in the bylaws, of which 30 will be selected from the membership of each of the two present associations. During the interim period, Philip E. Heim, president of the Agricultural Limestone Institute, and Vincent H. Shea, president of the National Agricultural Limestone Association, shall serve as co-chairmen until the selection of the full board and the election of the officers.

4. It was agreed that there will be no affiliation with the National Crushed Stone Association. It was also decided that at least every other year, a convention would be held in the Middlewest.

5. After provisions are made for general administration, equal amounts of the budget are to be allocated between the educational and legislative programs.

6. The committees voted that Robert M. Koch serve as executive secretary during the interim period before the membership meeting in January.

As this issue went to press these recommendations were being considered and it appeared that the merger was all but officially concluded.

Cement Merger

IDEAL CEMENT CO., Denver, Colo., and Pacific Portland Cement Co., San Francisco, Calif., recently called special meetings with their stockholders to consider a possible reorganization and merger plan. The plan calls for Ideal Cement Co. to offer Pacific Portland Cement Co. stockholders 250,000 shares of Ideal's $10 par stock in exchange for the outstanding 500,000 shares of Pacific stock. Under the plan the Pacific company would be operated by Ideal but retain its corporate identity for the present. Completion of the deal was said to be contingent upon acceptance by stockholders of 80 percent or more of Pacific stock. It was also proposed that the board of directors of Ideal Cement Co. be increased from 9 to 13 to give new stockholders representation.

Uranium from Phosphate

THE ATOMIC ENERGY COMMISSION recently revealed it has three contracts with Florida phosphate plants for the production of uranium and expects to have more soon. A process has been developed whereby uranium can be extracted economically as a by-product of triple superphosphate. The plants now under contract with A.E.C. are U. S. Phosphoric Products Co., East Tampa; International Mining and Chemical Co., Mulberry; and Armour Fertilizer Works, Bartow.

Magnesite Plants

MAGNESITAS ESPANOLAS RAMON QUIJANO Y COMPANIA, El Escorial, Spain (near Madrid), is constructing new plants for the processing of magnesite. These plants will enable the company to export raw, dead burned and caustic magnesite to countries in short supply of the product. The company states that the most important characteristic of its magnesite is the exceptionally low percentage of lime.

Cover Picture

CONSUMERS SAND AND GRAVEL CO., Kalamazoo, Mich., reports that a newly designed gravel pumping dredge, recently put into operation, has contributed to a more even flow of material, reduced hazards to driving machinery and greater freedom from shutdowns than is usually experienced in pumping.

The dredge is driven by a single power plant; main pump, priming pump, stone ladder and winches are all driven by one General Motors 6-110 diesel engine. The 8-in. Hubscher stone ladder is equipped with claws of extra heavy construction, and with a clutch mechanism which is engineered so it can be reversed and so that slippage occurs when a heavy obstruction is encountered. The dredge, which is 100 ft. long by 16 ft. wide, has nine watertight bulkheads and will remain afloat with any two of them flooded. The 75-ft. long suction pipe will dredge to a depth of 50 ft., without adding more pipe.

The pumping unit was built by The Earle Equipment Co., Detroit, Mich. In the background is a new 150 ft. concrete tunnel housing conveyors which run to screening and crushing plant on hill.

Ideal's Research Division

GREAT WESTERN AGGREGATES, INC., a subsidiary of Ideal Cement Co., Denver, Colo., has established an office in Ft. Collins, Colo. The corporation was organized in August, 1950, to carry on the study of raw material sources used in the production of cement, and for research into the field of aggregates of all types. The research work was formerly carried on at Ideal's Boettcher, Colo., plant. Plans for building a new research laboratory are now being considered. R. F. Blanks was recently appointed vice-president and general manager of the subsidiary.

Industrial Explosives

THE BUREAU OF MINES recently reported that the consumption of explosives in quarries and nonmetal mines in 1950 amounted to 141,249,390 lb. of all types of explosives, which reflected a 16 percent increase over the 1949 consumption. All states using large quantities of explosives for quarrying and nonmetal mining showed increased consumption with the exception of New York which showed a slight reduction. Most of the explosives used was of the high explosives other than permissible type but some black blasting powder and permissibles also were used.

Change of Ownership

ALL ASSETS AND LIABILITIES of Texas Lightweight Aggregate Co., Dallas, Texas, have been purchased by Texas Industries, Inc., a newly organized corporation. The status and rights of stockholders in Texas Lightweight Aggregate Co. are to remain unchanged. Stock in the new corporation is being issued to them on a share-for-share basis. The name Texas Lightweight Aggregate Co. will be retained and be used to designate the Houston branch office and processing plants at Eastland, Stafford and Rosenberg.

Officers of Texas Industries, Inc., are Ralph B. Rogers, president; Cedric Wilson, vice-president and chief engineer; Orville W. Erringer, vice-president; Charles L. Moruzzi, treasurer; and Harold B. Pressley, Jr., secretary.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 22,685,000 bbl. of finished cement in August, 1951, as reported to the Bureau of Mines. This was an increase of 4 percent compared with the output in August, 1950. Mill shipments totaled 25,852,000 bbl., an increase of 3 percent over the August, 1950, figure, while stocks were 19 percent above the total for the same month in 1950. Clinker production during August, 1951, amounted to 22,009,000 bbl., an increase of 7 percent compared with the corresponding month of the previous year. The output of finished cement during August, 1951, came from 151 plants, located in 36 states and Puerto Rico. During the same month of the previous year, 21,884,000 bbl. were produced in 148 plants.

Quartz Contract

QUARTZ-MINING BARITE CORP., Utah, Nev., recently completed a contract with General Services Administration for supplying G.S.A. with its entire plant output for the next 12 months. G.S.A. stated that the Barite corporation has struck the first domestic source of quartz measuring up to stockpile specifications for quartz crystal, used in frequency control of radio and other electronic equipment.

The quartz deposits are located on the Goshute Indian Reservation in northern Utah, and quartz mining and Indian employment are governed by a lease between Barite Corp. and the Council of the Federated Indian Tribes of the Goshute Reservation. Under the lease, 10 percent of the mine's gross profits go to the Goshute tribe.

Until now, the United States has been purchasing stockpile specification quartz crystal from foreign countries. Brazil is the principal world producer.

Coming Conventions

November 14-15, 1951—
National Slag Association, Annual Meeting, Knickerbocker Hotel, Chicago, Ill.

November 26-27, 1951—
National Association of Silo Manufacturers, Annual Convention, Palmer House, Chicago, Ill.

November 26- December 1, 1951—
Chemical Industries Exposition, 23rd Exposition, Grand Central Palace, New York, N. Y.

January 15-17, 1952—
National Agricultural Limestone Institute, Annual Convention, Hotel Statler, Washington, D. C.

January 16-17, 1952—
Wisconsin Concrete Products Association, 32nd Annual Convention, Plankinton House, Milwaukee, Wis.

January 21-24, 1952—
American Road Builders' Association, 50th Anniversary Meeting, Rice Hotel, Houston, Texas.

February 11-15, 1952—
National Sand and Gravel Association, 36th Annual Convention and Exhibit, The Stevens, Chicago, Ill.

National Ready Mixed Concrete Association, 22nd Annual Convention and Exhibit, The Stevens, Chicago, Ill.

February 18-20, 1952—
National Crushed Stone Association, 35th Annual Convention and Exhibit, The Stevens, Chicago, Ill.

February 18-20, 1952—
National Concrete Masonry Association, Annual Convention, New Yorker Hotel, New York, N. Y.

February 18-21, 1952—
American Institute of Mining and Metallurgical Engineers, 79th Annual Meeting, Hotel Statler, New York, N. Y.

February 26-28, 1952—
American Concrete Institute, 48th Annual Convention, Netherland Plaza, Cincinnati, Ohio

February 27-28, 1952—
American Concrete Pressure Pipe Association, 3rd Annual Convention, Drake Hotel, Chicago, Ill.

February 28-March 1, 1952
American Concrete Pipe Association, 44th Annual Convention, Drake Hotel, Chicago, Ill.

March 3-5, 1952—
American Concrete Agricultural Pipe Association, 2nd Annual Convention, Brown Palace Hotel, Denver, Colo.

June 23-27, 1952—
American Society for Testing Materials, 50th Anniversary Meeting, Hotels Statler and New Yorker, New York, N. Y.

Perlite Institute Honored

THE PERLITE INSTITUTE was presented the 1-A Grand Award of the American Trade Association Executives at the association's annual meeting, September 17, in Chicago, Ill. Wharton Clay, secretary-treasurer of the Perlite Institute, received the award in behalf of the association. The Hon. Charles Sawer, Secretary of Commerce, headed the jury which selected the award winners in the 15th year of this competition among the 1300 members of the trade association group.

The citation for the award read as follows:

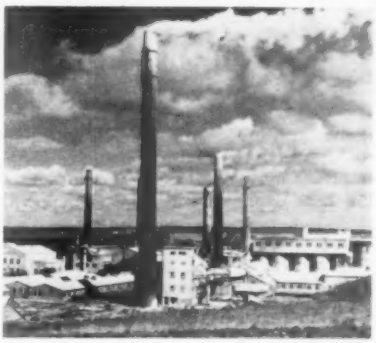
"—for its excellent services to its industry and the public and especially for its notable educational program explaining and promoting many uses and applications of perlite. In a period of less than two years, the Institute accomplished the recognition of perlite by building contractors and government officials as a valuable product in building construction. Its research efforts led to uniformity of production, to the development of testing methods of great value in proving the merit of perlite as an aggregate, and to a broadened market in other fields. The national welfare benefited by the availability of a new and useful product of high quality and significant economic value."

Plant Celebration

INTERNATIONAL MINERALS AND CHEMICALS CORP., Chicago, Ill., in celebration of the completion of its Mulberry, Fla., phosphate division's new $350,000 office building and $500,000 warehouse and service center, held a barbecue at Bartow, Fla., for its employes and their families. Approximately 3000 were in attendance. Participating in the informal ceremonies were R. B. Fuller, manager of the corporation's Florida phosphate division; F. A. Koechlein of Chicago, and Marion Wiggs, president of the local union. Mr. Wiggs praised the corporation for its outstanding labor relations, terming the company an outstanding example of proper management's relations in the country. On behalf of the union, he congratulated the company on the progress it had made, especially in providing the pleasant working conditions afforded in the new office building, plant and service center.

Buys Stone Quarry

ARMCO STEEL CORP., Middletown, Ohio, recently purchased all the outstanding stock of the Ohio Marble Co., operating concern, and Piqua Stone Products, Inc. The plant is at Piqua, Ohio. The two companies have been the principal source of limestone for many years for the two blast furnaces Armco operates at its Hamilton, Ohio, plant. It is estimated that about 25,000,000 tons of limestone are available on the Piqua properties which consist of about 650 acres.



Shown above is the oldest and largest cement plant in North Jutland. Known as "Rordal," it was built in 1889 and has the highest stacks in Denmark and among the largest rotary kilns in the world

Armco Steel Corp. is building a new plant at Middletown and the company's combined needs for limestone at Hamilton and Middletown will be about 400,000 tons per year. The limestone production at the Piqua quarries is expected to supply those requirements, in addition to supplying about 200,000 tons of road stone, agricultural limestone, whiting for the rubber industry, putty filler and other products.

Lawrence Expansion

LAWRENCE PORTLAND CEMENT CO., New York, N. Y., recently announced it has been issued a certificate of necessity by the Defense Production Administration for amortizing a part of the cost of expanding its plant facilities at Thomaston, Maine. The certificate permits the company to write off in five years, 70 percent of approximately $1,000,000 of the cost of the new equipment being installed at Thomaston. The expansion is designed to increase the capacity of this mill from 1,200,000 bbl. of portland cement annually to 1,800,000 bbl. Plans call for the installation of an 11- x 356-ft. kiln, together with other auxiliary equipment.

In its application for a certificate, the company disclosed that Army and Navy air bases in Maine are now taking many thousands of barrels of cement per month and are expected to continue doing so for an extended period. In addition, current and proposed military installations dot the entire territory serviced by Lawrence's Thomaston plant.

Decentralization of Cement Plants

THE DECENTRALIZATION PROGRAM which has been underway in recent years in the cement industry has been speeded up by the nation's defense program, according to a recent article appearing in the *New York Journal of Commerce*.

The article stated that the cement industry increased its capacity by over 10,000,000 bbl. last year to approximately 250,000,000 bbl., and that 10,000,000-12,000,000 bbl. of new capacity will be added this year, which conforms with estimates from other sources. A striking feature of the 1950 expansion program, as pointed out, is the large amount of new capacity being located in the South. Approximately 50 percent of the industry's investments in new facilities are said to be below the Mason-Dixon Line. There has also been a considerable expansion of the industry in the Far West.

More than a dozen companies are undergoing expansion and decentralization. A large part of the new capacity in the South is resulting from the construction of large plants where no facilities existed before. In the northern and eastern regions where the cement industry's capacity has heretofore been concentrated, several plants are being enlarged through the installation of new kilns.

There have been other factors which have contributed to the industry's southern and western expansion besides the defense program's plans to decentralize the nation's basic industries, according to the article. One important factor has been the sharp rise in railroad freight rates which has made long distance hauls uneconomical. The construction of new aircraft and other defense plants in the South and West has also contributed to the rapid growth of the cement industry in those areas.

The expansion program is expected to overcome spot shortages which have occurred during the last two years when home construction was running at high levels, and this year, with construction of defense plants all over the country.

Silica Refractories Plant

GENERAL REFRACTORIES CO., Philadelphia, Penn., recently announced plans to build a $3,000,000 silica refractories manufacturing plant near Warren, Ohio. General Refractories, large producer of temperature-resisting brick and mortars, will manufacture a product at Warren to be used principally in the iron and steel industry.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of August and for the first eight months of 1951 are listed by the Portland Cement Association as follows:

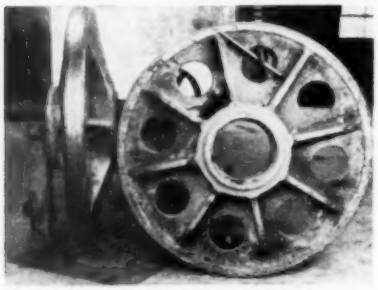
	Sq. yd. awarded	
	During August 1951	During first eight months 1951
Roads	1,436,269	18,425,899
Streets and alleys	2,357,612	16,957,279
Airports	714,131	12,245,409
Totals	4,508,012	47,628,587

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Rebuilding and Hard Facing Machinery Parts

THERE HAS BEEN an increasingly wide acceptance in the rebuilding and hard-facing of various types of heavy equipment, chiefly tractor and crusher parts, in the last year due considerably to the increasing scarcity of replacement parts. Some comments indicate that in many cases the automatic rebuilding of wearing parts is the only solution.

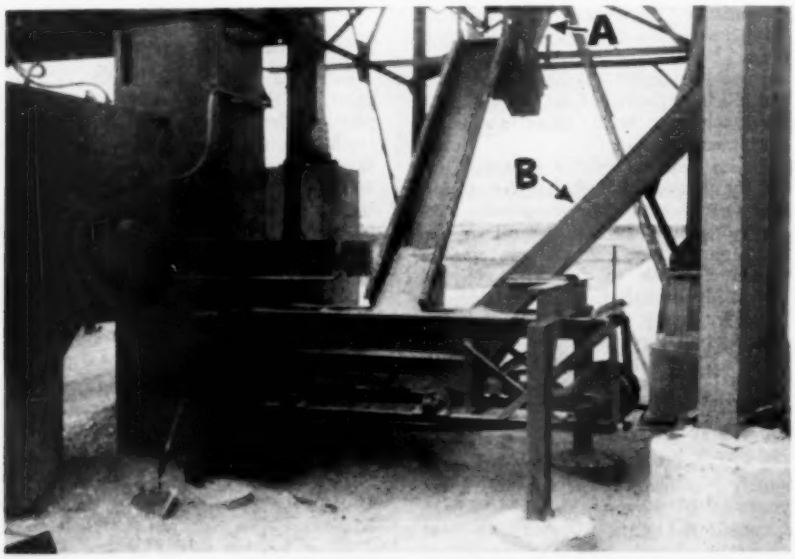


Idler wheels from a power shovel rebuilt by the automatic method

One common example of vital wearing parts now in short supply is the tractor roller; the destructive service to which the roller is subjected results in rapid wear and frequent replacement. About four years ago, Stoody Co. of Whittier, Calif., developed a hard-facing wire for application through the conventional automatic electric welding head. Known as Stoody 105, it was specifically designed for rebuilding such tractor and shovel parts as track rollers, idlers, house rollers, arch wheels and the like. The hard-facing wire is a fabricated material, steel strip formed as a continuous tube into which the alloying elements are introduced in the process of manufacture. According to Stoody Co., the alloys are selected to give a deposit of extreme toughness and high wear resistance. Equal or better service life, at about half the cost of new replacements, is claimed for this method of rebuilding and hard-facing.

Feeders Simplify Blending

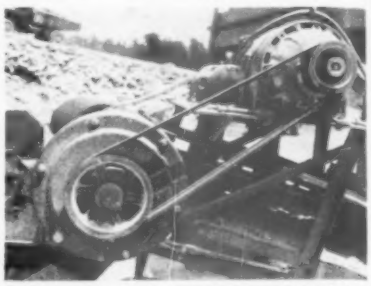
WHERE SEVERAL AGGREGATE bins are grouped to permit making a two- or three-product blend, the actual blending installation, and the blending itself, can be simplified by the judicious use of electric vibrating feeders of the Jeffrey or Syntron types. These materially simplify the problem of getting the different products to a central point without the use of elaborate screw or belt-type conveyors. In the illustration, chute B feeds by gravity direct. Source A was too far away to be chuted direct so a small Jeffrey vibrating feeder was inserted in the line. Both sources feed a small reciprocating feeder that delivers to a bucket elevator. The elevator serves a bin where the blended aggregate is stored. The problem of conveying a short distance is easily solved, and a high degree of control with regard to amounts can be exercised by the use of relatively inexpensive electric vibrating feeders. Chute B is controlled by a quadrant gate installed in the chute itself.



Chute B feeds by gravity direct and is controlled by quadrant gate; chute A has small vibrating feeder inserted in the line

Conveyor Drive

A COMPACT, NEAT AND SERVICEABLE DRIVE for a belt conveyor was recently observed in a southern crushed lime-



Belt conveyor driven by reduction unit V-belted to motor

stone operation. Here a short stub conveyor was taking stone from a 4¼-ft. Symons cone and returning it to the screening system. The drive was an American reduction unit V-belted to a General Electric motor. The illustration shows the simplicity of installing such a type of drive for a belt conveyor.

Conveyor Gallery Supports

A CRUSHED GRANITE OPERATION in the Southeast processes five sizes of crushed stone—1½ in., ¾ in., ½ in.,

Reinforced concrete pillars support overhead belt conveyors

road stone and ballast. These are stockpiled over a concrete reclaiming tunnel. For stockpiling the three sizes of rock, three parallel belt conveyors operate in an overhead gallery. The supports for this gallery are reinforced concrete pillars, as the one shown in the illustration. The supports have been so designed as to prevent lateral or side movements that are apt to occur when an uneven drawn-down in the stockpile is made.

Steel Plate Weight Chart

By W. F. Schaphorst

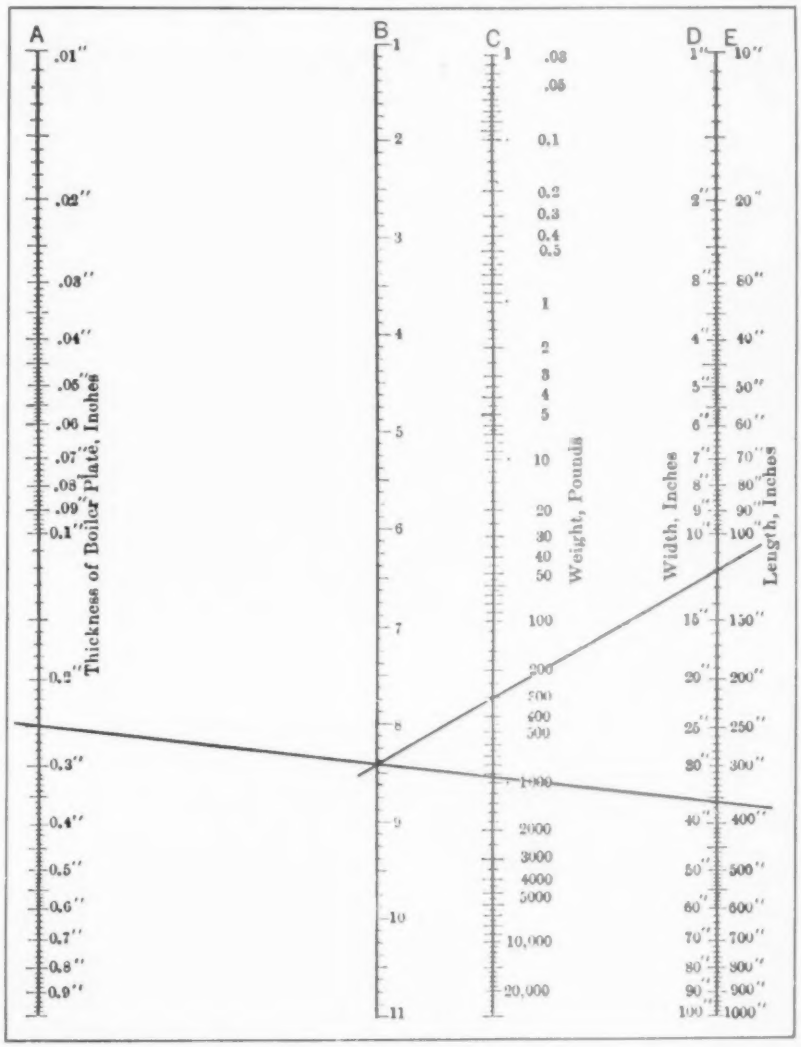
IN TWO SIMPLE AND QUICK OPERATIONS you can determine the weight of any steel plate by using this chart. It is merely necessary to know the three dimensions of the plate—the length, width and thickness.

For example, what is the weight of a steel plate ¼ in. thick, 30 ft. long and 12 in. wide?

Run a straight line through the thickness, column A, and the length, column E, and locate the intersection with column B. Then from that point of intersection run over to the width, column D, and the intersection with column C gives the answer.

Thus in this instance we connect the 0.25 in., column A, with the 360 in column E because there are 360 in. in 30 ft. Then from the point of intersection in column B as shown by the drawn lines we run over to the 12 in column D and the intersection with column C tells us that the weight is a little more than 300 lb.

As will be noted, the range of the chart is great enough to take care of nearly any steel plate. Thicknesses vary from 0.01 in. to 1 in.; lengths vary from 10 in. to 1000 in.; widths vary from 1 in. to 100 in. As a result, the weights included run all the way from 0.08 lb. to 25,000 lb.



Nomograph for determining weight of steel plate

Water-Filled Tires for Mine Vehicles

LONGER LIFE AND REDUCED operating costs for tires on underground mine vehicles run at low speeds (less than 5 m.p.h.) may be achieved through 100 percent water filling of these tires in place of the conventional air pressure method, as announced by Goodyear Tire & Rubber Co. after two years of tests and research on the project.

The tests disclosed that use of the water filling method permits adequate pressure to be maintained constantly, until the tire is worn out or punctured. In a water-filled tire, internal pressure varies with the load, giving minimum pressure when the load is light and increased pressure as the load increases, which is said to keep the flexing of the tire within reasonable limits, reducing cord fatigue in the sidewalls.

Tire for underground mine vehicle is inflated with water by special pump

Filling of mine tires with water to the recommended pressure is accomplished with a special high-pressure positive-displacement pump having suitable connections for tire valves. The pump may be obtained from shuttle car manufacturers.

Truck Loading Bin

THE USE OF 96-IN. ARMCO STEEL TUBES for reclaiming tunnels has become quite common, especially at large construction sites where the equipment is usually liquidated once the job is finished. The illustration shows how one operator converted some of this old tubing into a truck-loading bin. The chute can be seen on the left side of the bin, which in this instance is used for sand. The bin is filled by use of a Northwest crane which slings an Owens clamshell bucket.

Loading bin made from 96-in. steel tubing

New Machinery

ROCK PRODUCTS

Steel Derrick

CLYDE IRON WORKS, INC., Duluth 1, Minn., has announced an addition to its line of material handling equipment, a self-contained, full-revolving steel derrick, available with gasoline or electric power, and able to be swung by hand or power. Having a tail swing of but 5 ft. 6 in. and requiring no stiff-legs or guy lines, this Model W-3 derrick occupies a minimum of ground space. Boom lengths of 20, 30 or 40 ft. are available, with load capacities from 2000 lb. at a 40 ft. radius to 10,000 lb. at a 10 ft. radius.

Self-contained derrick

Anti-Rust Paint

THE MONROE CO., INC., 10703 Quebec Ave., Cleveland 6, Ohio, has developed an anti-rust paint called Rust-Cure, which, it is claimed, can be applied right over rust without wire-brushing, scraping or sandblasting. Available in black, aluminum and clear, the paint is suitable for exterior and interior use.

Condensing Filter

AIR-LINE ENGINEERING CO., 4758 Warner Rd., Cleveland, Ohio, has announced the availability of a compressed air line filter which is also said to function as a condenser, due to its extra size and extended surface. Called the Airlenco condensing filter, this device has a steel outer shell 6 in. in diameter and 36 in. long and a steel inner cartridge 5 in. in diameter by 24 in. long, loosely packed with Fiberglas. It is said that since the Fiberglas is nonabsorbent, the filter requires no servicing except for frequent draining to remove the accumulated water and oil.

Small Portable Plant

UNION BOILER AND MANUFACTURING CO., Lebanon, Penn., has developed a portable crushing and screening plant designed for rock or gravel operations. The unit is built around a "Dodd" triple jaw crusher with a jaw opening of 11 x 24 in. Material is fed from a scoop which can be loaded at ground height. The plant is 25 ft. long, 92 in. high, 8 ft. wide and weighs 16,000 lb. It has a rated capacity of 30 t.p.h. minus 1½-in. stone. The crusher is equipped with safety springs which compress if tramp iron gets into the crusher. The sizing screen can be set to remove both fines and oversize or can be adjusted so that all the material is delivered to the leading conveyor.

Portable crushing and screening unit

Opposed Impeller Pumps

DE LAVAL STEAM TURBINE CO., 825 Nottingham Way, Trenton, N. J., has designed a new line of multi-stage opposed impeller pumps for general medium pressure and temperature service up to approximately 1000 g.p.m. and 1200 p.s.i. for temperatures to 350-400 deg. F. These pumps are said to be especially well suited to boiler feed service, oil refinery service and general water services such as hydraulic and mine drainage. The impellers are mounted back to back to balance axial thrust and the volutes are staggered 180 deg. to balance radial thrust.

Multi-stage pump

Magnetic Amplifier Control

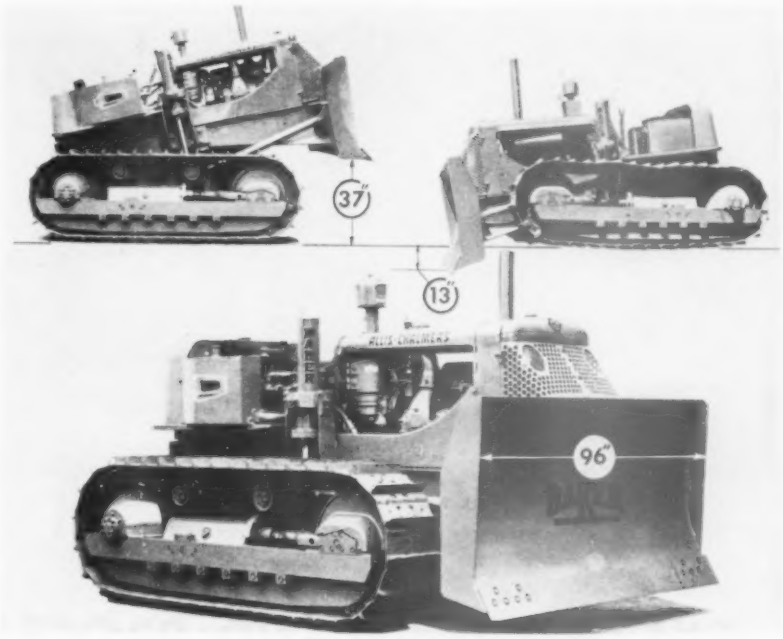
ELECTRIC MACHINERY MANUFACTURING CO., Minneapolis 13, Minn., has announced the development of its Regutron magnetic amplifier control, used with the company's adjustable-speed magnetic drive, an electromagnetic torque transmitting device which gives variable speed output when used in combination with a constant speed motor. Company officials report that a saturable core reactor amplifier system using non-moving parts accomplishes a precise, stepless control of speed to within ±0.5 percent of speed called for. The magnetic drives are built in ratings of 25 hp. and higher in the usual motor speeds, and are applied to loads such as fans, centrifugal pumps and centrifugal compressors.

Small Synchronous Motor

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee 1, Wis., has introduced a small synchronous motor which operates on the reluctance principle, has no brushes, slip rings, rotating coils or permanent magnet. It is said that the motor can be built to operate continuously at any voltage below 250 volts, either single phase or polyphase, and is able to start and pull into step at any frequency from 10 to 400 cycles. A typical motor is 4 in. in diameter by 2⅜ in. in length and weighs 2.6 lb.

Redesigned Bulldozer

THE BAKER MANUFACTURING CO., Springfield, Ill., has announced the development of a big-capacity, no-pushbeam bulldozer, said to embody the first radical change in industrial dozer design since the hydraulic control bulldozer in 1926. Designated as the 9-X, the machine mounts an 8-ft. wide blade on the 70-drawbar hp. 9-ton Allis-Chalmers HD-9 tractor. The dozer and tractor frames are bolted together as an integral unit, the tractor frame itself becoming the pushbeam. The blade has a maximum rise of 37 in. and a drop below ground of 13 in.



Big capacity bulldozer and tractor

Dust Exhauster

COLUMBIA TECHNICAL CORP., 5 E. 57th St., New York 22, N. Y., has announced the Konigsborn drilling dust exhauster, an apparatus which is said to increase efficiency in rock drilling, at the same time improving working conditions. The exhauster is operated with compressed air from the available air system. Although this device is especially recommended for roof bolting and in tunnel headings where multidrill jumbos are used, it is reported to be usable in any quarry to improve working conditions by freeing the air of dust.

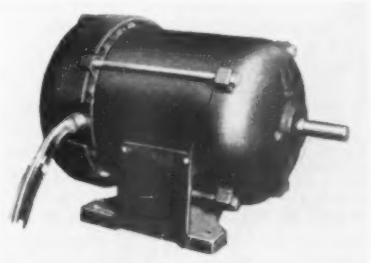
Water Coolers

BETTIS CORP., Houston, Texas, has announced production of its portable Igloo water coolers, insulated to keep water cool and coffee hot for groups of men on projects out in the field. The galvanized sides are corrugated, seams are double-folded and the cooler is made with or without push-button faucet which is inset flush with the side to keep from being broken off. The unit has a thick layer of Dow Stryofoam between the inner and outer walls and it is made in 1½, 3, 5 and 10 gal. sizes.

Insulated water cooler

Single Phase Motor

GENERAL ELECTRIC CO., Apparatus Dept., Schenectady, N. Y., has extended its Tri-Clad line of single-phase capacitor motors to include one of totally enclosed fan-cooled construction. Features of the new design include starting capacitors and switch mounted within the frame, said to provide maximum protection with minimum space requirements. Available in ratings of 1, 1½, 2, 3 and 5 hp., the new line was developed for use where severe conditions of dirt, grit or moisture are encountered.



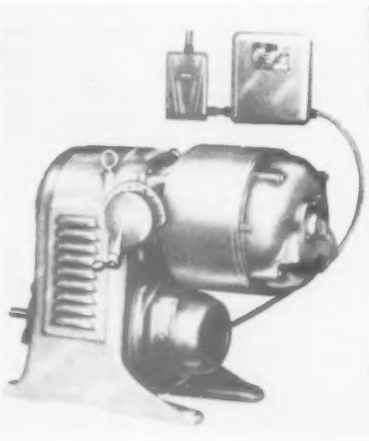
Enclosed fan-cooled motor

Flow Signal Transmitter

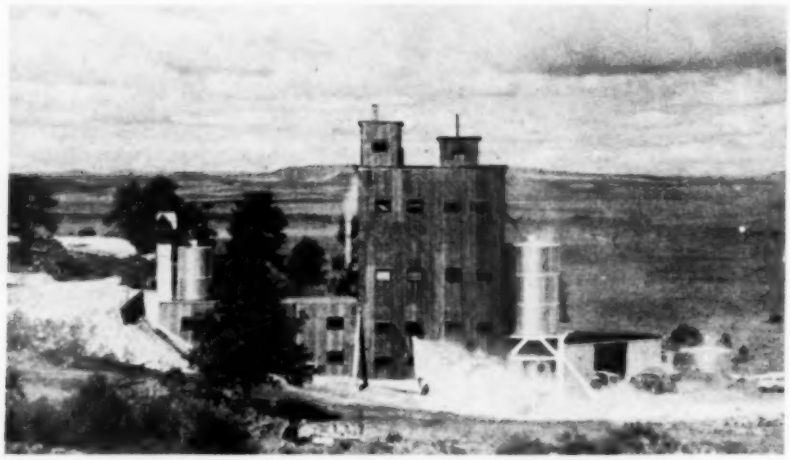
HAGAN CORP., P. O. Box 1346, Pittsburgh 30, Penn., has announced production of its flow signal transmitter, a pneumatically operated pressure-differential measuring unit. This device transmits proportional signals to remote recording or indicating instruments, or to automatic control elements. The signals may be linear with flow or linear with pressure differential. The transmitter is available in standard assemblies for measuring at full scale from 5.5-in. water column to 100 p.s.i., with any static pressure up to 1500 p.s.i.

Motor Brake

U. S. ELECTRICAL MOTORS, INC., 200 E. Slauson Ave., Los Angeles 54, Calif., has a new development which is said to make possible fast, controlled braking of U. S. Varidrive motors. The brake, a Warner type ICB, is mounted directly on the variable speed shaft, eliminating transmission of the braking action through the belt. Containing few parts, the brake has a mechanical movement of 1/16 in., and its frictional force is controlled directly by the magnetic action of the brake. Adaptable to both Varidrives and Varidrive-Syncrogears, this brake is d-c actuated with low power requirements, maximum of 25-35 watts.



Motor with new brake arrangement



New perlite mill of F. E. Schundler & Co., Inc., at Antonito, Colo.

F. E. Schundler & Co. also has two expanding plants and will supply graded ore to other producers

EXCAVATING AND PROCESSING PERLITE

SINCE F. E. SCHUNDLER & Co., Inc., Joliet, Ill., and Long Island City, N. Y., has been processing vermiculite aggregates for 20 years, it was natural for the company to recognize the attributes of perlite for certain aggregate uses. For several years Mr. Schundler personally examined scores of perlite deposits throughout the western states. Samples ranging from 100-lb. lots to carloads were tested. Several test carloads of material from the No Agua mountains of New Mexico were processed through the Joliet plant. Upon expansion, the ore was found to be tough and resilient. The 2000 acres of claims were surveyed and when the extreme uniformity of the ore was established, work began on the construction of a complete and modern crushing mill.

The mill was built at the foot of the mountains with the foundations imbedded in solid perlite ore. The plant is rated at 25 t.p.h. and carload shipments of screened and graded ore are made from Antonito, Colo., over the Denver and Rio Grande Western railroad.

The No Agua mountains rise out of the San Luis Valley Plateau. Mining of perlite is done at the top of these mountains at an 8900 ft. elevation by conventional benching methods. A 300-c.f.m. Gardner-Denver compressor is used for drilling. The crude perlite rock upon being loosened by black powder charges is loaded by a ½-cu. yd. Bay City power shovel. Ford F-7 trucks with 8-cu. yd. Anthony dump bodies haul the material down the winding road to the stockpile at the plant.

A D-7 Caterpillar tractor-dozer is used to keep the mining operation clean, for stripping, and for general road work. An International tractor with a Hough front-end loader is kept at the plant for similar activity.

Mill Operations

At the mill the crude perlite ore is dumped through a grizzly into a 14- x 24-in. Telsmith jaw crusher, powered by a 25-hp. motor. The crushed ore is then conveyed by a 12-in. bucket belt elevator to a 9- x 16-ft. Butler bin, from which it goes by steel apron feeder to a dryer. This dryer is 66 in. in diameter and 40 ft. long single shell, powered by a 30-hp. motor. No. 2 fuel oil is used with a Hauck No. 783 oil burner with a 7½-hp., 20-oz. blower. Even in this normally dry country, perlite has some surface moisture and if this is removed more efficient crushing and gradation can be accomplished. Moisture laden air is removed from the dryer through a 6-ft. diameter cyclone with a 10-hp. exhaust fan.

From the end of the dryer the ore is lifted by a 14-in. bucket belt elevator to three 4- x 10-ft., double-deck, completely enclosed Tyler Hum-mer screens. The coarse ore from these screens is taken through a 3-ft. Symons shorthead cone crusher. This crusher is powered by a 75-hp. motor.

Since excessive fines are detrimental to a quality ore, a 14-ft. Raymond mechanical air separator is used to take off the fine material. This separator is powered by a 40-hp. motor. The fines are removed to the dump by an 18-in. belt conveyor, and the finished product goes by a 10-in. bucket elevator to additional Butler bins holding 130 tons each. All speed reducers on the elevators are Dodge torque arms. The bins are truck-drive-under and the product is hauled to the railroad in covered Trailmobile semi-trailers attached to Ford F-8 tractors. This unique plant layout was designed to obtain the maximum flexibility with the least wear and maintenance. Several product sizes are produced with a minimum of adjustment necessary.

The main building at No Agua is 35 x 104 ft. with a 57-ft. clearance at the high end in which are housed the Tyler Hum-mer screens. A separate powerhouse in which are also the office, shop and a control laboratory is located nearby.

All power for the plant is supplied by a 3-phase, 440-volt, 60-cycle, 275-kw., D-397 Caterpillar diesel-electric generator. The diesel engine is rated at 400 steady hp. at 8000 ft. elevation. It is a V-12, 1200-r.p.m. engine with blower. The fuel tank holding 37,250 gal. of fuel oil with pump feed is located a safe distance from the main buildings.

At the shipping point, which is outside Antonito at the end of the standard gauge, storage space for 180 tons of finished material has been provided with a 32-ft. high bin. A 14-in. bucket elevator and 18-in. conveyor feed both the bin and load products into railway boxcars. A 4-cycle, 20-hp. Wisconsin engine operates this elevator and conveyor. The 15- x 28-ft. adjacent building has been constructed

for storing grain doors and other shipping supplies.

At the plant site a complete repair shop has been installed in the powerhouse, including a Hobart gasoline-electric arc welder of 300 amp. capacity. Lights for the plant, when the diesel is not operating, are supplied by a Wisconsin gasoline engine driven 6-kw. light plant.

The entire plant was engineered by Carl Schulz, general superintendent of F. E. Schundler & Co., Inc., who operates out of the Joliet office.

M. B. Mickelsen will be superintendent of the No Agua operations and will be in full charge of the mining, milling and shipping of the various grades of perlite ore available from this plant. Incidentally, Mr. Mickelsen is the original locator of the perlite deposit and also took part in the discovery of the pumice mine on San Antone mountain in northern Taos county, Mexico.

Loading crude perlite rock for the haul from top of No Agua mountains to mill at the foot of the mountains

Varied Market

Expanded perlite from this mine will be sold from the Schundler plants at Joliet, Ill., and Long Island City, N. Y. The Coralux Perlite Corp. of New Jersey at Metuchen, N. J., and Midwest Perlite Products, Inc., West Des Moines, Iowa, will also expand this product and merchandise it under the Schundler trade name of Coralux Perlite. Several other perlite expanders also will be established as licensees to expand and merchandise it.

Expanded perlite is principally used as a lightweight aggregate replacing sand in gypsum and cement plasters. Plasters of this type have a 4-hr. fire test at the Underwriters' Laboratory in Chicago and are rapidly receiving great acceptance and wide usage throughout the country.

The use of perlite as a lightweight aggregate in insulating concrete also is becoming generally accepted. By using perlite aggregates, savings in dead load of as much as 80 percent can be effected. This will be principally a saving in steel which is of utmost importance during any period of steel shortage.

Numerous other uses of expanded perlite are indicated by recent shipments of this product from the Schundler expanding plant in Joliet. At De Kalb, Ill., the company manufactures acoustical tile and high temperature block insulation, with No Agua perlite being one of the principle ingredients. It is also being used as an additive to certain types of paint and lacquers; in foundry sands and as a filtration aid.

The Schundler laboratory, under the direction of P. S. Denning, technical director, is constantly studying the peculiar characteristics of perlite and applying these characteristics to a wider usage of the product.

Delivering graded perlite ore to the storage bins at the railhead

Group Bargaining Decision Reversed

THE FEDERAL CIRCUIT COURT in Chicago recently reversed the decision of the National Labor Relations Board in the Morand case (see January, 1951, issue of ROCK PRODUCTS, p. 113), concerning concerted action by employers in group bargaining. The N.L.R.B.'s decision in the Morand case forbade outright discharge by an employer group to counter a "piecemeal" strike, in the absence of other factors. Another decision by the board, in the Davis Furniture case, was even more restrictive of freedom of action by employers who engage in group bargaining with labor unions.

The action of the board in the Davis case is before the Ninth Circuit Court for review, but employers are encouraged to believe that the Circuit Court's decision in the Morand case will be followed in principle by the Ninth Circuit.

The right of groups of employers to meet union strength with employer strength, within specified limits, has been re-established by the Circuit Court. The Morand court decision has been summarized for the National Sand and Gravel Association by Charles A. Horsky who has listed the following principles laid down by the court, respecting the right of members of a multi-employer bargaining group when confronted by a partial strike following an impasse in bargaining negotiations by the group:

1. The employer association is entitled to treat the strike against one or a few members as a strike against the group.

2. In view of this, the non-struck members have a right to "counter the strike's effectiveness by laying off, suspending or locking out" their employes who are members of the striking union and not covered by an existing contract.

3. But neither the non-struck nor struck employers may discharge employes who are members of the striking union.

Large tonnages of agricultural limestone produced by HMS process at American Limestone Co. plant

By WALTER B. LENHART

AMERICAN LIMESTONE Co., Knoxville, Tenn., has been pioneering in the field of agricultural limestone for almost 40 years and during the four decades has developed many new uses for ground limestone. Today it is an industry within an industry, whose ramifications and scope of activities are quite unique. Besides pioneering the sale and use of ground limestone, the company is using crushed rock beneficiation in such a manner, and at such low operating costs that sand and gravel as well as crushed stone operators may well study the methods since they may indicate a cheap method of removing cherts from limestone, or of removing coal, waterlogged wood fragments, or "reactive aggregates" from commercial stone. Developed largely by American Zinc Co. of Tennessee, of which American Limestone Co., is a subsidiary, the core of this technique is the heavy-media separation process, or what is more conveniently called the HMS process. Other names for the technique are "sink-float," and the "differential density process." Hereinafter, the term HMS will be used to indicate the process.

From time to time ROCK PRODUCTS has published data on the HMS process. One of the most comprehensive descriptions appeared in the October, 1948, issue at which time data from six plants in the fluorspar, magnesite and barite fields was summarized. At that time the process had not been used in connection with an aggregate operation. Later (May, 1949) ROCK PRODUCTS published a description of the process in connection with a gravel operation near Winnipeg, Manitoba, Canada. Because of the low operating costs and the extreme benefits accrued to the aggregate being processed, there was a quickened interest in the rock industries as to the practicability of its further use.

Heavy-Media Process for Aggregates?

In our years of travel we have repeatedly seen laborers in gondolas throwing out water-logged wood chips and root fragments from gravel; we have seen operators throw away gravel to get the sand because the coarse aggregate contained deleterious materials. We have seen dredges pull up anchor and seek a new dredging area because their diggers had encountered coal that sourced from coal seams cutting across the river beds, or from a barge load of coal upset above the gravel bars and which contaminated the crude aggregate to such an extent that the owners had to abandon it as a source of gravel. We know of one island in the Ohio river that could be used as a source of gravel, but it is said to contain so many walnut shells that the material is not usable. It is this group of operators who should study these data as it may solve an important problem. That HMS has a place in the aggregate industry is indicated from the fact that the U. S. Army Corps of Engineers uses as a laboratory test a modified HMS process. In this test, a medium in the 2.4 sp. gr. density range is used. Any rock that floats is considered soft or unsound and if too much material floats the source of aggregate is rejected.

In these days when freight rates play such an important part in the economy of an aggregate producer, the situation often arises whereby a strategically located deposit, because of some characteristics of the material, may be unusable. The HMS process, for as little as 9 to 10 cents per ton, may make that material meet the specifications and this might more than off-set dollars in added freight rates.

Agstone Plus Zinc

It is even thinkable that the zinc deposits which are co-related to the limestone operations of American Limestone Co. could not be operated profitably except by the use of the HMS process. Conversely, it is also thinkable that American Limestone Co. would not be the organization that it is except for what might be called an impurity—zinc, in this case—but by combining the economics of limestone and zinc and processing with HMS, millions upon millions of tons of limestone have been made available for agricultural and other uses and the zinc recovered. As to which is the by-product, it all depends on one's viewpoint.

The operations of American Zinc Co. of Tennessee, and its affiliate, American Limestone Co., can best be seen by referring to Fig. 1. Here we see at least four sources of limestone that contain variable amounts of zinc. At Mascot the zinc is removed and all rejects are sold as either commercial stone, or as ground limestone, but the bulk of the latter is agstone. Because of the HMS process, a separation of material as coarse as minus 2 in. is being made, one fraction going for commercial stone — concrete aggregate, ballast, road stone and other uses. In this aggregation of plants and operations is a plant that can regrind coarse limestone for manufac-

RECOVERS

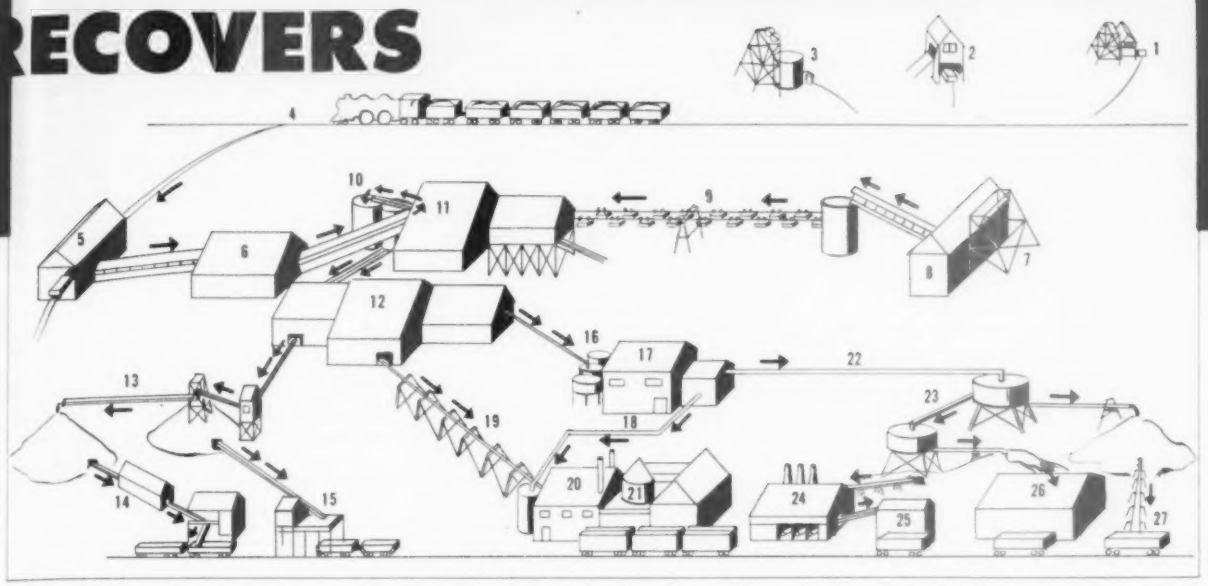


Fig. 1: Flow sheet of American Zinc Co. of Tennessee and American Limestone Co. operations. (1) Jarnagin mine, Jefferson county; (2) Athletic mine, Jefferson county; (3) Grasselli mine, Jefferson county; (4) and (28) Southern railway system; (5) Railroad car unloading station; (6) and (8) Coarse crushing plants; (7) No. 2 mine, Mascot; (9) Aerial tramway; (10) Storage bins, crushed ore, all mines; (11) Heavy-media separation; (12) Jigging and fine grading; (13) HMS coarse tailings, storage and reclaiming; (14) American Limestone's crushed stone and sand plant; (15) Railroad ballast loading station; (16) Flotation plant feed; (17) Flotation plant; (18) Flotation concentrates, undried; (19) Jig concentrates, undried; (20) Concentrate dryer; (21) Dried concentrates, storage and loading; (22) Flotation tailings to American Limestone Co. limestone plant; (23) Limestone classifiers; (24) Limestone dryers; (25) Limestone storage, bulk loading; (26) Limestone storage, bag loading; (27) Undried limestone storing and loading

tured sand. In that fraction of coarse limestone containing the zinc, further processing and reductions in size eventually result in a ground limestone that is free of zinc. This material can be dried in a battery of dryers and sold for uses that call for a bone-dry material, or it can be sold for uses where small amounts of moisture are permitted, or it can be loaded "as is" from the reclaiming ponds. American Limestone Co. operates two quarries to obtain material to augment the Mascot operations. One of the quarries is near Johnson City, Tenn., and the other is its Strawberry Plains operation near Mascot.

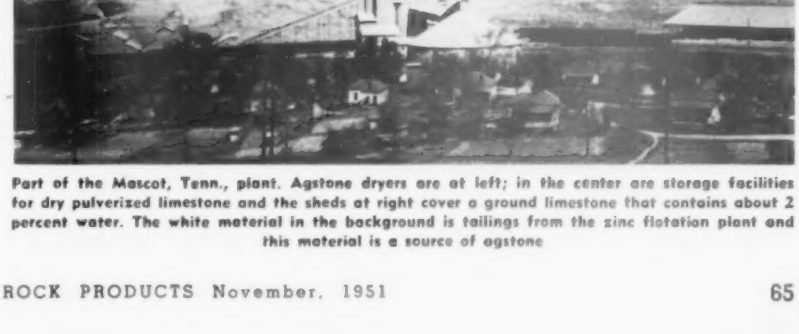
Fundamentals of Process

The HMS process consists of placing minus 2-in. rock in a heavy fluid mixture, whose density is easily and closely controlled. In this fluid the lighter rocks float, and the heavier ones sink thereby affecting a separation. The heavy fluid can be galena (lead sulfide) ground in water to a pulp, or as in the case at Mascot, can be finely ground ferrosilicon which is likewise mixed with water to make a heavy pulp. As the ferrosilicon has many advantages which will be apparent as the description unfolds, it has replaced the system whereby ground galena was used and hereinafter we will confine our descriptions to the ferrosilicon medium.

In its bare essentials, HMS is an extremely simple process. In actual practice the separation is equally as simple; one feeds the rock via a belt conveyor or chute into the separatory vessel. The light rocks float off and overflow over a suitable weir, and the heavy rocks sink and are withdrawn via an airlift arrangement. That part of the process that might appear complicated, relates to the recovery of the ferrosilicon adhering as a film to the two fractions, which in mining nomenclature are referred to as the "sink" fraction, and the "tailing" or "float" fraction. Ferrosilicon is relatively expensive so it must be recovered and returned to the system. To describe the process effectively, relatively new phraseology must be employed that can sound complicated. However, when one visualizes a plant treating 4000 tons per 24 hours that occupies hardly as much space as most primary crushing plants in our rock industries, and with seldom over two men per shift, one can begin to appreciate that HMS is efficient, low in operating cost, foolproof. We predict in the years ahead that HMS will become an integral part of rock processing techniques and will play an important part in the processing of concrete aggregates.

The capacity of an HMS plant is, in a general sense, governed by the size of the separator vessel. At Mascot, a $10\frac{1}{2}$-ft. cone is used. Cones up to 20 ft. in diameter are in use. The specific gravity of the media in a large cone is less affected by moisture in the feed, because of the larger volume of media in the cone.

American Zinc, Lead & Smelting Co. was the first company to operate a commercial heavy-media separation plant for the treatment of minerals and after successful operation acquired the licensing rights to the proc-



Part of the Mascot, Tenn., plant. Agstone dryers are at left; in the center are storage facilities for dry pulverized limestone and the sheds at right cover a ground limestone that contains about 2 percent water. The white material in the background is tailings from the zinc flotation plant and this material is a source of agstone

esses. Later, the company appointed American Cyanamid Co. sole technical and sales representative for the processes.

Media Used

Earlier attempts to apply the principles of HMS revolved about the use of heavy liquids such as acetylene tetrabromide. This liquid is still used somewhat in laboratory test work as it lends itself to accurate dilutions and density controls. In the laboratory it is possible to fractionate this liquid at specific gravity increments of 0.025 to 0.05 so that close separations can be made. On the Mascot limestones a specific gravity of 2.85 is the true separation gravity, and in laboratory tests using acetylene tetrabromide almost 85 percent of the ore fed to the heavy liquid was rejected at once as a float product. This meant that crushing to minus 2 in. (and after screening out the minus ¼-in. to 5/16-in. fines), 85 percent of the feed to the process could be sent to the limestone aggregate processing section which is operated by American Limestone Co.

However, for commercial operations acetylene tetrabromide was not practical so a cheaper heavy liquid was sought. When it was discovered that galena could be ground in ball mills (and in water) and that the galena would not settle out readily, it became apparent that such a homogeneous pulp could be used as a heavy liquid, or medium. So for about ten years, prior to 1948, the Mascot operation treated nearly 10,000,000 tons of limestone using the galena medium. However, ferrosilicon appeared to have many advantages, so the plant was converted over to the use of ferrosilicon as the heavy solid. The new plant went into operation in November, 1948, and to date has treated roughly 2,000,000 tons. By using ferrosilicon media to replace galena, operating costs dropped from 21.2 cents per ton milled, to 9.12 cents per ton, milled.

Ferrosilicon is a product of the electric furnace. It is ground to minus 100 mesh before arrival at the plant. By mixing it with water a homogeneous, nonsettling pulp lends itself to accurate specific gravity controls. A pulp or heavy liquid with specific gravity in the 3.50 range is possible with ferrosilicon, but as most separations are in the 2.65 to 3.00 sp. gr. range, ferrosilicon can be readily used by simply diluting with water to the specific gravity desired. However, 3.50 sp. gr. appears to be about the top limit.

Ferrosilicon Recovery

One of the big advantages in the use of ferrosilicon is that it can be recovered magnetically, and by the use of other magnetic devices, the pulp can be flocculated or de-flocculated at will. This means that the nonsettling characteristics of ferrosilicon can be destroyed by magnetic equipment, and after being destroyed, the properties can be restored by other types of magnets. This all adds up to a cheap and extremely efficient means of recovering the ferrosilicon adhering to the sink and float fractions.

Beneficiating Zinc

At Mascot, under actual plant conditions, and at the rate of 4000 t.p.d., 72 percent of the total tonnage goes to the HMS plant and 56 percent of the limestone is rejected as a coarse tailing. This means that 2880 t.p.d. go to the HMS separatory cone and a little over half is rejected at once as a coarse aggregate.

The processing at Mascot is designed primarily to recover the zinc content of the ore and the heavy media is one step in that series of operations. It could be considered as a preliminary sorting process with a rough concentrate made (the sink fraction). This coarse rougher concentrate is later re-ground to roughly 65 mesh and the zinc recovered by flotation. The tailings from the flotation plant are sold for agricultural limestone and for other uses. The material is of unquestionably high value as attested to by its 37 years of performance.

In the HMS process it is customary to treat coarse materials only; i.e., in the 2-in. to ¼-in. range. Finer material than ¼ in. can be treated in the Dutch State Mines cyclone separator if so desired. This is a process making separations through the use of centrifugal and centripetal forces but is not used at Mascot.

The Mascot ore is a dolomitic limestone with the zinc being in the form of a honey colored sphalerite (ZnS). The dolomite contains small amounts of chert and pyrite. The mineralogical analysis of the mill feed is as follows:

	Percent
Calcium carbonate	49.4
Magnesium carbonate	35.2
Iron oxide and aluminum oxide	1.5
Zinc sulfide	4.5
Insoluble	9.3
	100.0

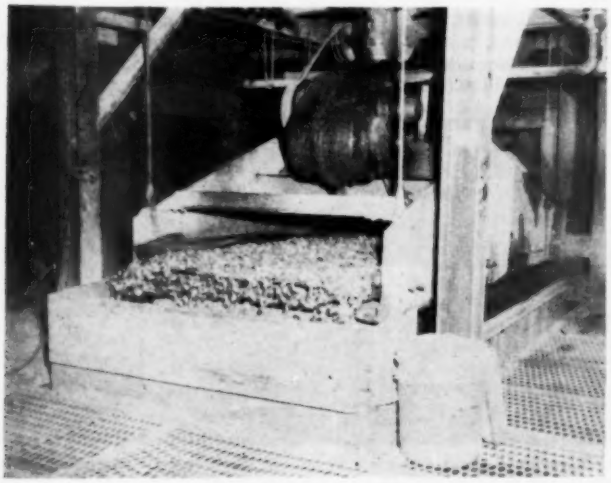
Specific Gravity of Medium

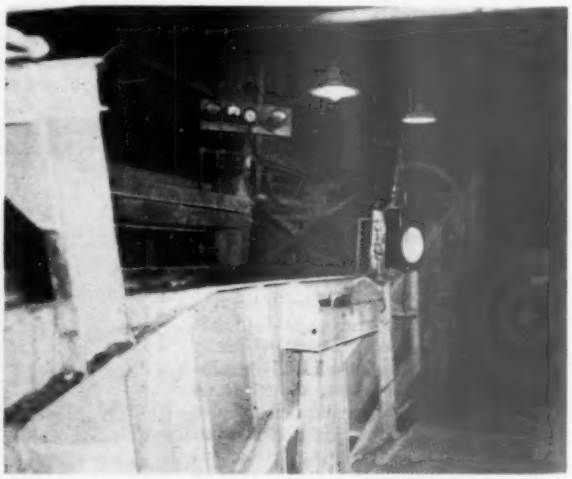
In the separatory vessel the specific gravity of the medium at the top of the cone is kept at 2.83. At the bottom of the cone the specific gravity is slightly higher and the differential is about 0.09.

It will be seen from Table I that with the medium having a 2.964 sp. gr. about 6.31 percent of the material sinks. At more dilution higher percentages sink and, because at Mascot zinc is the desired end-point, the best results are obtained at medium densities in the 2.85 range. If the medium is diluted to 2.70 sp. gr., only about 2 percent will float so one can appreciate the closeness of the separation. The tabulation is the result of test work.

Separatory Cone

The separatory vessel used at Mascot is a 10-ft. 6-in. dia. cone fed by a chute. The screen analysis of the cone





Left: The material from the tailing wash screen is used for commercial stone and can be regreund for agstone. Right: This spiral is used as a "densifier" and is a storage unit for the ferrosilicon that makes up the heavy density separator liquid

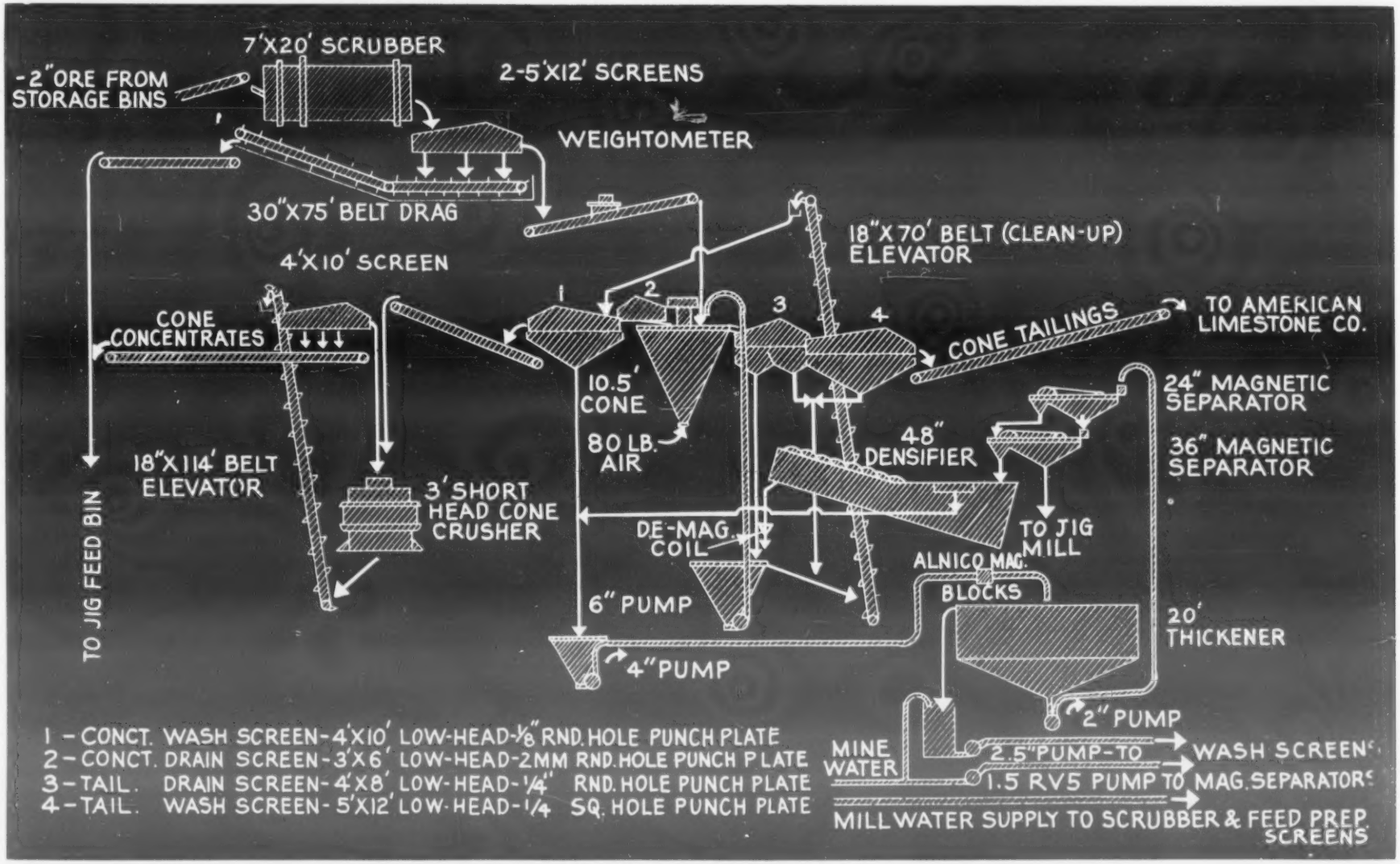
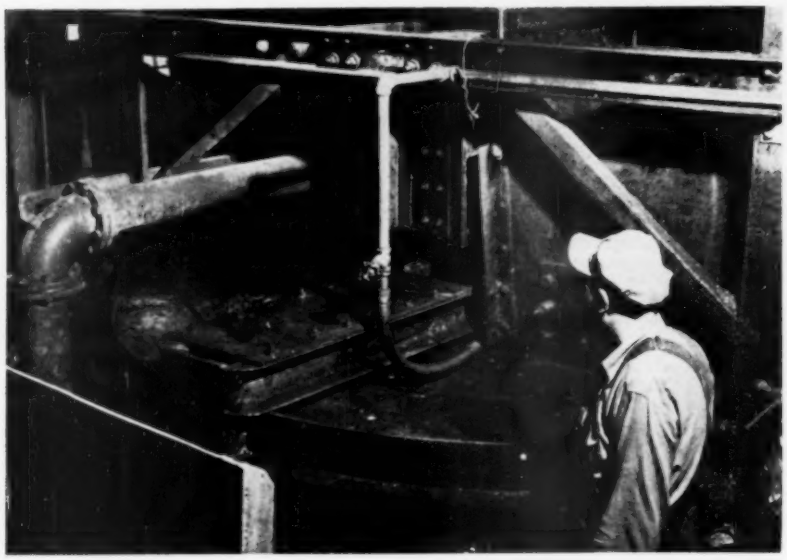


Fig. 2: Heavy-media separation flow sheet



The 10½-ft. separatory cone. Limestone for commercial uses or for agstone overflows the weir at left center. The part of the matrix which contains zinc is air-lifted to the drainage screen at right

feed, cone concentrate (sink fraction), and the tailings or float fraction are given in Table II. The float portion of the material flows over a weir to a 4- x 8-ft. Allis-Chalmers Lo-Head screen. The heavy or sink fraction is removed by an airlift. The airlift is an 8-in. diameter pipe suspended near the center of the cone. Fig. 3 gives the essentials of the cone's construction.

Flow of Material

The flowsheet of the circuit is simple, as shown in Fig. 2. The minus 2-in. ore from the mill bins is conveyed to a 7- x 20-ft. Allis-Chalmers rotary scrubber, where it is subjected to intensive washing to liberate the fines from the coarser pieces of rock. The scrubber discharges onto two 5- x 12-ft. Allis-Chalmers low-head washing screens equipped with 5/16-in. square hole woven wire cloths. Oversize from these screens is conveyed to the cone, with the tonnage rate as determined by a Merrick Weightometer being recorded on a Rateograph at the cone operating floor. The minus 5/16-in. material from the wash screens is dewatered by a 30- x 75-ft. belt drag. The sands are delivered to the mill feed bin and the minus 65 mesh drag overflow material is thickened and pumped directly to flotation.

The minus 2-in. plus 5/16-in. feed is treated in the 10½-ft. separatory cone. Rakes rotating at 5 r.p.m. are required to prevent build-up of medium solids on the sides of the cone and are mounted on the airlift, which serves as the drive shaft. An air consumption of 90 c.f.m. is required to elevate the concentrates to the top of the airlift. The air is supplied at 100 p.s.i. pressure by an Ingersoll Rand compressor.

An adjustable air jet permits the

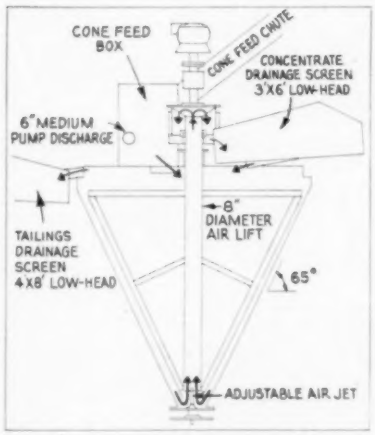


Fig. 3: Separatory cone

operator to control the exact point at which air enters the airlift. This feature is valuable in controlling the gravity of the bottom medium, and thus the differential in the cone. At present the tip of the jet is ½ in. above the bottom of the 8-in. airlift, and excellent control is obtained at this point. The jet is made of 1½-in. stainless steel shafting with a ¾-in. diameter hole in the center to carry the air. The outer surface of the jet is threaded so it can be raised or lowered through a packing gland by turning a handwheel. Plows are mounted on the bottom of the rakes to prevent buildup of medium and tramp steel on the bottom plate. These plows are cut out of discarded ball mill liners and bolted to the bottom of the rakes. They normally last from one to two years.

The concentrate airlift discharges onto a 3- x 6-ft. drainage screen, and the medium drains back onto the surface of the cone through a punch plate

Table I. Sink and float products at various specific gravities

Product	Wt., lb.	Wt., percent	Cum. percent weight Sink	Float
Sink 2.964	24.25	6.31	6.31	—
2.964-2.90	14.75	3.84	10.15	93.69
2.90-2.85	21.25	5.53	15.68	89.85
2.85-2.825	131.75	34.25	49.93	84.32
2.825-2.80	132.00	34.33	84.26	50.07
2.80-2.75	35.50	9.23	93.49	15.74
2.75-2.70	16.75	4.36	97.85	6.51
Float 2.70	8.25	2.15	—	2.15
TOTAL	384.50	100.00	—	—

with 2 mm. round holes. Use of the smallest possible hole at this point has proved advantageous in removing fine concentrates from the bottom medium and preventing an accumulation of this material in the cone, with a resultant lowering of the bottom gravity. Washing of the concentrates takes place on a 4- x 10-ft. screen using a ⅛-in. round hole punch plate. (Data on the screens used in the HMS plant are listed in Table III.)

Aggregate By-Product

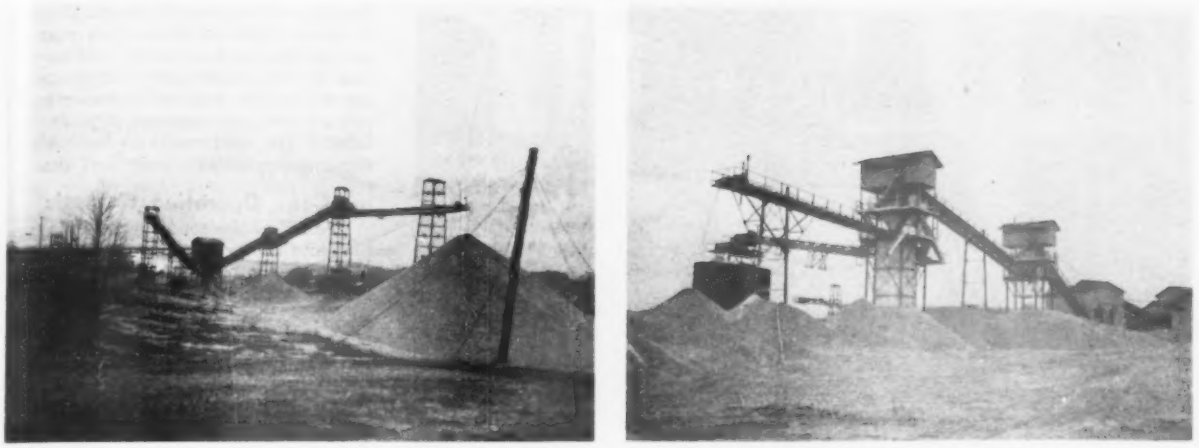
Tailings or limestone that are sold as commercial stone overflow the cone over a weir 42 in. wide onto a 4- x 8-ft. drainage screen equipped with a ¼-in. round hole punch plate. The depth of medium and rock over the weir is 4 in. during normal operations. The oversize of the screen passes to a 5- x 12-ft. washing screen using ¼-in. square hole cloths. The clean limestone tailings are then conveyed to storage piles for sale as railway ballast and concrete aggregate.

Cleaning Circuit

The undersize from the tailings drainage screen enters a pump sump and is returned to the cone by a 6-in. Wilfley pump. A gate under the screen is used to divert a portion of the undersize to the cleaning circuit, and in addition, a continuous light overflow from the pump sump goes to the cleaning circuit. All the undersize from the

SCREEN SIZE	PERCENT WEIGHT CONE FEED	CUM. PERCENT WEIGHT
+ 1½"	6.46	6.46
+ 1"	27.75	34.21
+ ¾"	24.12	58.33
+ ½"	21.36	79.69
+ ⅜"	10.32	90.01
+ 5/16"	4.80	94.81
+ ¼"	4.29	99.10
− ¼"	0.90	100.00
TOTAL	100.00	
SINK FRACTION		
+ 1½"	4.46	4.46
+ 1"	27.01	31.47
+ ¾"	22.79	54.26
+ ½"	20.59	74.85
+ ⅜"	10.67	85.52
+ 5/16"	4.98	90.50
+ ¼"	5.12	95.62
− ¼"	4.38	100.00
TOTAL	100.00	
FLOAT FRACTION		
+ 1½"	4.31	4.31
+ 1"	29.30	33.61
+ ¾"	23.74	57.35
+ ½"	21.05	78.40
+ ⅜"	10.62	89.02
+ 5/16"	4.84	93.86
+ ¼"	5.20	99.06
− ¼"	0.94	100.00
TOTAL	100.00	

Table II. Screen analysis of cone feed, sink fraction and float fraction



Stockpiling facilities for commercial stone at Mascot

	FEED PREPARATION SCREENS (TWO)	CONCENTRATE DRAINAGE SCREEN	CONCENTRATE WASH SCREEN	TAILING DRAINAGE SCREEN	TAILING WASH SCREEN
SIZE	5' X 12'	3' X 6'	4' X 10'	4' X 8'	5' X 12'
TONNAGE PER SCREEN	85 T. P. H.	20 T.P.H.	20 T.P.H.	100 T. P. H.	100 T. P. H.
SLOPE OF SCREEN (UP-FEED TO DISCH)	2° 30'	4°	2°	2° 30'	2°
AMPLITUDE	3/8"	7/16"	3/16"	3/8"	3/8"
NO. OF SECTIONS PER DECK	3	1	1	1	3
TYPE OF CLOTH AND SIZE OF OPENING	WOVEN WIRE, 5/16" SQ. HOLES, 0.135" DIA. WIRE	2 MM. RD. HOLE PUNCH PLATE, 16 GAUGE	1/8" RD. HOLE PUNCH PLATE 12 GA. WITH 1/2" SQ. HOLE PP. 10 GA. FOR PROTECTION	1/4" RD. HOLE PUNCH PLATE, 10 GA.	WOVEN WIRE, 1/4" SQ. HOLES 0.135" DIA. WIRE
LIFE IN DAYS	FEED —26 CENTER —36 DISCH. —26	13	22	16	FEED —27 CENTER —28 DISCH. —29
MECHANISM, SIZE AND H.P.	3B - 7½ H.P.	2B - 5 H.P.	2A - 5 H.P.	2C - 5 H.P.	3B - 7½ H.P.

Table III. Screen data for heavy-media plant

railing and concentrate wash screens is handled by a 4-in. Wilfley pump, which delivers this contaminated medium to a 20-ft. Dorr thickener. Before entering the tank, the material passes through a permanent Alnico magnet which causes the ferrosilicon particles to flocculate and settle rapidly. The thickened dirty medium is pumped by a 2-in. Wilfley pump to the primary magnetic separator, a 24-in. Stearns machine. Its tailing is retreated in a 36-in. Dings Crockett magnetic separator. Clean medium from both machines enters a 48-in. Colorado Iron Works densifier, which thickens it to a specific gravity of 3.20 and delivers it through an a-c de-magnetizing coil to the medium pump sump for return to the cone. The a-c de-magnetizing coil de-flocculates the ferrosilicon and puts it back into condition whereby it does not settle rapidly. Overflow from the densifier is returned to the 20-ft. Dorr thickener. The tailings and overflow from the secondary magnetic separator, which contain excellent values in fine sphalerite, are dewatered and handled in the jig and flotation circuits. Thickener overflow water is used on the concentrate and tailings wash screens.

Pumps

The five pumps in the circuit have the following functions:

6-in. Wilfley—Returns cone overflow medium and densifier discharge to cone

4-in. Wilfley—Delivers dirty medium to 20-ft. thickener

2-in. Wilfley—Delivers thickened dirty medium to magnetic separators

2½-in. Fairbanks-Morse — Delivers thickener overflow to sprays on wash screens

1½ RV-5 Cameron Motorpump—Delivers clean water to sprays on magnetic separators

The pumps have the following operating characteristics:

Pump	Connected hp.	Actual hp.	r.p.m.	g.p.m.
6-in. Wilfley	40	37	700	600
4-in. Wilfley	15	8.2	770	218
2-in. Wilfley	5	4.4	1160	150
2½-in. Fairbanks-Morse	20	14.7	1250	147
1½ RV-5 Cameron Motorpump	5	3.7	3450	10

A clean-up elevator with an 18-in. x 70-ft. belt is used for three purposes: to handle all clean-up material from the basement, to elevate the undersize from the tailings wash screen for delivery to the 4-in. pump, and to add new medium to the circuit. The elevator discharge passes through the concentrate wash screen for removal of all plus ⅛-in. material and is then pumped to the medium cleaning circuit. A second elevator employing an 18-in. x 114-ft. belt, raises the crushed cone concentrates to a 4- x 10-ft. screen which closes the circuit on this product.

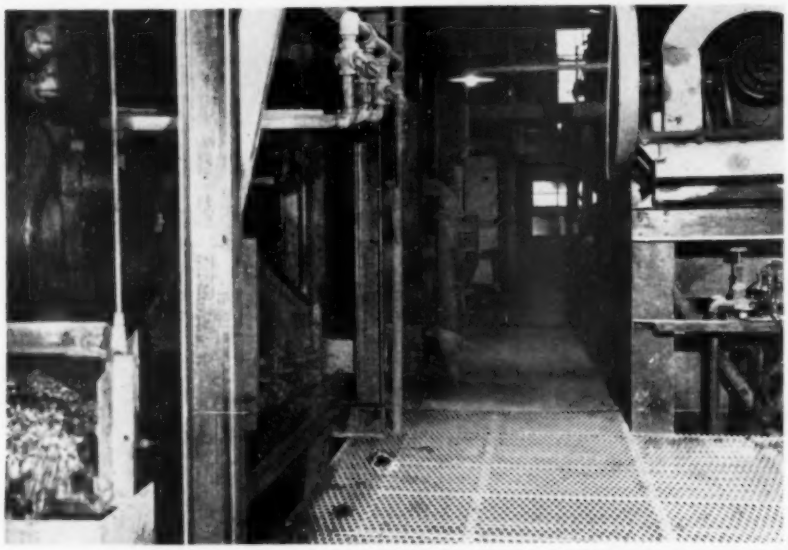
Magnetic Separators

The original cleaning circuit to recover the ferrosilicon had only one magnetic separator, the 36-in. Dings machine. It gave excellent service and medium recovery of 99.9 percent. The circuit as originally constituted has remained unchanged, except for the addition of a second magnetic separator. This machine was put in by the Stearns Magnetic Manufacturing Co. Its performance compared favorably with that of the Dings machine and it has been kept in service as insurance against a break-down on either of the separators. In addition, use of primary and secondary separators has been beneficial in keeping medium consumption at a low level.

The 24-in. Stearns machine was situated so it could be used as either a primary or secondary separator. It has proved more convenient to operate it as a primary separator, since no additional pumping is necessary. Its tailing is re-treated in the Dings machine, which picks up any losses that may occur due to a temporary overload on the Stearns. Medium is being cleaned at a rate of approximately 9 t.p.h., with a loss of 13.2 lb. per hr., or 0.95 gm. per gal. of separator tailings. The exceptionally high recovery made by this circuit justifies the continuous use of two separators, although one is adequate to handle the load under normal circumstances.

Ferrosilicon Losses

The distribution of the total ferrosilicon loss of 0.15 lb. per ton milled is shown in Table IV. Slightly more than half the loss is in the tailing from the cleaning circuit. Medium adhering to the cone products represents 30.3 percent of the loss, and 16.5 percent is unaccounted for. The greater part of this material is probably lost through oxidation of the ferrosilicon.



Cone operating floor in the heavy-media separation plant. Tailing wash and drainage screens are on the left; densifier is at right; separatory cone is behind screen

Table IV. Distribution of ferrosilicon losses

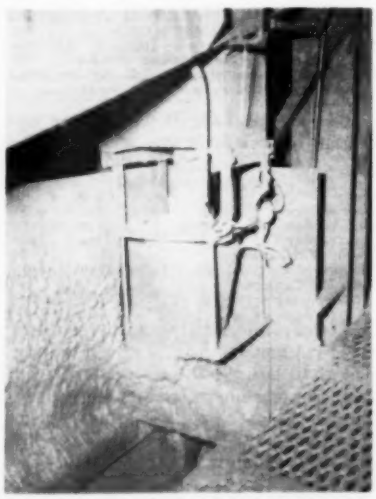
Product	FeSi, lb. Per hour	Per ton milled	Percent of total loss
Magnetic separator tailings	13.2	0.080	53.2
Cone concentrates	2.5	0.015	10.1
Cone tailings	5.0	0.030	20.2
Unaccounted for	4.1	0.025	16.5
Total	24.8	0.150	100.0

Washing Nozzles

All washing is done with Spraco ramp-bottom non-clogging nozzles, which have proved highly satisfactory in this type of service. No. 9R nozzles, each of which delivers 7.4 g.p.m. at 10 lb. pressure, are used on the feed preparation screens with 15 nozzles per screen in three rows of 5 nozzles per row. This gives a water consumption of 111 gal. per screen, or 1.30 gal. per ton of ore washed. No. 7R nozzles, each delivering 6.4 g.p.m. at 18 lb. pressure, are used on the concentrate and tailing wash screens. The concentrate screen has 8 nozzles in two rows of 4 each, supplying a total of 51.2 g.p.m. or 2.6 gal. per ton of concentrates washed. There are 15 nozzles over the tailing wash screen in three rows of 5 each, delivering 96 g.p.m. or 1.0 gal. per ton of tailings washed. The total water consumption for all screen washing is 369.2 g.p.m. Water used in the scrubber amounts to 520 g.p.m.

Schedule of Operations

The operating week in the HMS plant begins at 3:00 p.m. Monday, after all necessary mill repairs have been carried out on day shift. Operations are continuous until midnight on Friday or Saturday, depending upon whether the plant is on a 5-day or 6-day week. After the feed is cut off the medium is diluted and the air jet is opened wide to remove all rock from the cone through the airlift. Three bags of lime are added to the cone to prevent any possible hydrolysis and "setting up" of the medium while it is in storage. The medium circulating pump is then stopped and all medium in the pump sump and cone is drained into the basement. These steps are completed in about 45 minutes. The medium is drained into the clean-up elevator and returned to the densifier through the regular cleaning circuit until the densifier is full. This procedure requires about one hour. The remaining medium, representing perhaps 25 percent of the total circuit load, remains in the basement over the weekend. Two hours are required on Monday to fill the cone from the densifier and wash up the medium in the basement, and the circuit is ready for operation at the end of that time. This method of shutting down the plant has proved very satisfactory. The medium has been stored in this manner for as long as two weeks, and no difficulty was experienced in resuming operations. It is essential, however, to add an adequate amount of protective lime if the medium is to be inactive for any appreciable length of time.



The ferrosilicon from the densifier flows through this de-magnetizing coil after which the ferrosilicon is returned to the separatory cone

Cone Operation Controls

Control of the cone operation is simple, and under all normal conditions consists entirely of adjusting the amount of dilution water being added to the surface of the medium in the cone. The densifier spiral is kept at the bottom of the tank, and excess medium is stored in the densifier only when the feed is off the cone and on weekends when the plant is down. The operator checks the gravities every hour, using a 1 liter density bucket and a scale graduated to give a direct specific gravity reading. A Bristol recording meter provides a chart showing the density of the media in the cone. The cone top gravity is kept at 2.83. A higher reading calls for increased dilution water, and a lower reading for a reduction in the water. Little adjustment is necessary as long as a uniform feed to the cone is maintained. Normal practice is to clean about 9 tons of medium per hour, a quantity which is in excess of that actually required to keep the medium clean and maintain the desired viscosity. Thus a margin of safety is provided to take care of any increased fines or moisture in the cone feed. Five hundred lb. of new medium are added to the circuit daily, and more is used if necessary to maintain the required gravities in the cone. In addition, 50 lb. of lime is used daily to prevent hydrolysis of the ferrosilicon. The new ferrosilicon and lime are mixed with water in a small tank equipped with a high speed agitator. Preparation of the medium in this manner for approximately one hour before introducing it into the circuit insures complete wetting and conditioning of the fine ferrosilicon particles and prevents losses as the new medium passes through the cleaning circuit.

Adjustments to Medium

Sixty tons of 100-mesh ferrosilicon were used to load the circuit when operations began. During the first few months the differential in the cone was appreciably higher than it is now, due to the newness of the medium and consequently greater average particle size. Approximately 10 tons of magnetite were added in the first six months to stabilize the medium and create a differential of about 0.10 between the gravities at the top and bottom of the cone. After the medium had been in use for several months, its degree of fineness increased to a point where the condition of the early operating months was reversed and the differential began to drop. Changes

were made in the circuit to permit cleaning of more medium, and in May, 1949, 65-mesh ferrosilicon was substituted for the 100-mesh ferrosilicon formerly used for makeup medium. The coarser grade proved of value in maintaining the desired differential for several months. However, with medium consumption so low it has been difficult to maintain a differential of 0.10 during the past year.

Sedimentation Screen Analysis

In sedimentation screen analyses run on the medium pump discharge, densifier discharge, and new 65-mesh and 100-mesh ferrosilicon (Table V), only 3.8 percent of the pump discharge was retained on 200-mesh, as compared with 38.3 percent plus 200-mesh in the new 65-mesh ferrosilicon. Breaking down of the coarser sizes is due to attrition in the cone and pumps, and usually is compensated for by normal addition of new medium. The rate of addition, which is governed by the medium losses, determines the average particle size in the circuit. At Mascot the medium consumption has been too low to maintain the average particle size which prevailed during the early months of the operation. However, the medium eventually stabilized after a year's operation at a size sufficient to maintain a differential of 0.09 between the top and bottom gravities. Recovery has been excellent and the operation uniform at this level. A slight increase in differential would be beneficial to the concentrate grade, but might have an adverse effect on recovery. However, recovery of zinc is of prime importance in the plant, and production of a high-grade concentrate is secondary to obtaining the lowest possible tailing assay.

The cone overflow rate is 450 gal. of medium per minute at a medium to rock ratio (by weight) of 3.4:1. The 6-in. medium return pump is handling approximately 600 g.p.m. The difference of 150 g.p.m. between this and the cone overflow rate represents medium which is continuously by-passed back into the pump sump. The overflow rate can be changed if necessary by opening or closing the by-pass valve. The concentrate airlift discharges at a rate of 215 g.p.m. with a medium to rock ratio of 7.9:1.

Simplified Operation

One of the chief advantages of the ferrosilicon circuit lies in its simplicity. When the conversion from galena took place a major reduction in the number of pieces of equipment in service was made. Seven low-head screens, two elevators, two surge bins, and a set of 54- x 20-in. Garfield rolls were removed from service permanently. The four Wilfley tables and six decantation tanks in the old cleaning circuit were replaced with the densifier and two magnetic separators.

MICRONS / MESH	200 +65	147 +100	104 +150	74 +200	44 +325	37 +400	27.8 +600	18.5 +800	16.2 +1000	8 -1000
				NEW 65-MESH FERROSILICON						
PERCENT WT.	5.5	11.1	11.4	10.3	10.4	26.1	12.5	8.3	2.0	2.4
CUM. PERCENT WT.	5.6	16.6	28.0	38.3	48.7	74.8	87.3	95.6	97.6	100.0
				NEW 100-MESH FERROSILICON						
PERCENT WT.	0	0.6	8.8	21.0	18.0	16.3	19.0	12.9	2.2	1.2
CUM. PERCENT WT.	0	0.6	9.4	30.4	48.4	64.7	83.7	96.6	98.8	100.0
				DENSIFIER DISCHARGE						
PERCENT WT.	0.3	0.3	0.6	1.6	4.4	14.2	23.7	45.8	4.9	4.2
CUM. PERCENT WT.	0.3	0.6	1.2	2.8	7.2	21.4	45.1	90.9	95.8	100.0
				6-IN. MEDIUM PUMP DISCHARGE						
PERCENT WT.	0.9	0.4	0.8	1.7	4.4	20.8	29.8	36.0	3.4	1.8
CUM. PERCENT WT.	0.9	1.3	2.1	3.8	8.2	29.0	58.8	94.8	98.2	100.0

Table V. Sedimentation screen analysis of medium

The total number of pumps in use was reduced from eleven to five, and the length of the conveying system in the HMS plant and following it was reduced from 760 ft. to 513 ft. A 200-ton steel surge bin in the jig mill with one Syntron feeder took the place of a 1000-ton wooden fine ore bin with 14 reciprocating tray feeders.

The efficiency of the magnetic separators used to clean the ferrosilicon permits the handling of extremely wet, muddy ore with little difficulty.

Operating Costs

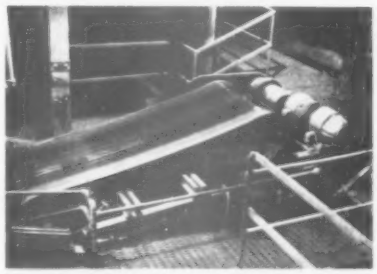
The following table gives a breakdown of the HMS operating costs in cents per ton milled:

Operating	Cents per ton
Medium	0.90
Reagents	0.13
Labor	2.94
Power	1.30
Miscellaneous	0.06
Maintenance and repairs	
Screens and screen cloth	0.80
All other costs	2.99
	9.12

Cost of ferrosilicon as of November, 1950, was quoted at 6 cents per lb. and lime at 0.65 cents per lb. It might be well to point out that for the average aggregate producer the specific gravity of separation that is required is generally 2.5 or less, and that in this gravity range, the medium may be composed of finely ground magnetite and water rather than ferrosilicon. This would reduce the medium cost appreciably since the price of ground magnetite is approximately $30 per ton as against $120 per ton of ferrosilicon. In cases where the specific gravity must be above 2.5, but still below that necessary at Mascot, mixtures of magnetite and ferrosilicon may be used to advantage.

Other pertinent tabulative data relating to the HMS at Mascot is as follows:

Operating costs (c.p.t. milled)	9.12
Medium consumption (Lb.p.t. milled)	0.15
Reagent consumption (Lb.p.t. milled)	0.02
Mill feed rate (t.p.h)	166
HMS feed rate (t.p.h.)	120



The cleaning circuit for the medium uses magnetic separators to aid in the recovery of the ferrosilicon

Tons milled per HMS man shift	620
Percent mill feed to coarse tailings	56.7
Mill percent lost time	5.0
Power consumption (kw.-hr. per ton)	1.92

Acknowledgment

American Zinc Co. of Tennessee is a wholly owned subsidiary of American Zinc, Lead & Smelting Co. of St. Louis, Mo. We wish to acknowledge our thanks to H. I. Young, president of American Zinc, Lead & Smelting Co., and R. P. Immel, vice-president of American Limestone Co., for courtesies extended, and for permission to publish these data. We also wish to thank H. A. Coy, general superintendent at Mascot, and R. E. Sansom, manager of the crushed stone section of American Limestone for their time and friendly help, and to D. B. Grove, R. B. Brackin, and J. H. Polemus we are indebted for much of the technical information. A considerable portion of the data here assembled was abstracted from papers these operators had delivered before various metal mining associations, along with data gathered at the time the Mascot operations were inspected. The three last mentioned men are mill superintendent, assistant mill superintendent, and metallurgist, respectively, at Mascot. Thanks are also due the American Cyanamid Co. as it is the representative for heavy-media separation process and to its field engineers R. H. Lowe and E. W. Gieseke.

The intake structure at Garrison dam when completed will be almost as high as the crane in the foreground

Gravel coarse aggregate; quality standards require sand to be shipped from out-of-state

By WALTER B. LENHART

Requirements for Garrison Dam

GARRISON DAM now under construction on the Missouri river above Bismarck, N. D., is the largest rolled-fill earth dam in the world. (Ft. Peck dam is larger but it was hydraulically filled). Garrison dam will form the largest reservoir surface area of any dam in the world. Approximately 86,000,000 cu. yd. of material will be excavated and of this 70,000,000 cu. yd. will go into the dam structure itself.

When one looks at the construction work from observation points near the dam site it is not a spectacular or impressive scene. One has to go down where work is in progress to get the impact of the magnitude of the work. For here a vast fleet of bottom-dump Euclids, Mack and other trucks are being loaded by 6- to 7½-cu. yd. Bucyrus-Erie electric shovels augmented by large capacity Northwest draglines. There are 65 Euclids on the job and these range from 22- to 33-cu. yd. capacity units; many are butane powered. These stream out in an endless flow, are unloaded and streak back to the loading point. Where the trucks dump, bulldozers and road graders take over and spread the earth into layers not over 9 in. thick; following these come 20,000-gal. capacity water sprinkler trucks and in the mass of dust are giant sheeps-foot rollers compacting the fill as it is being placed.

At first the work looks like a mass of disorganized confusion but one cannot haul and place over 100,000 cu. yd. of earth per day unless there is system and as one watches the work it's not long before one detects a clock-like precision in the movement of each vehicle. It is a "high-ball" job and yet with all the muck, dirt, noise and dust the accident rate is extremely low.

Contractors

Contract work on Garrison dam has been let by stages. For the first stage Garrison Dam Builders, Inc., were the prime contractors. This was a company formed by three Tennessee firms; H. N. Rogers and Sons Co., S. K. Jones Construction Co., and Forcum-James Co. They came in with two belt loaders, four shovels, two draglines, 42 bottom-dumpers, 16 carrying scrapers, 23 tractors and four road graders (maintainers). The belt loaders were Euclids, the shovels were Limas and Northwest and all had 2¾- to 3¼-cu. yd. Esco buckets. The draglines were Link-Belt Speeders with 4-cu. yd. Hendrick buckets and the carrying scrapers were Wooldridge Terra Cobras. The 42 bottom dumpers were Euclids ranging from 11 to 18 cu. yd. capacities. Of the 23 tractors, 15 were D8 Caterpillar units and six were Allis-Chalmers HD-19's. At one time this assembly of earth moving equipment was placing about 1,000,000 cu. yd. per week.

One of the batching plants at Garrison dam. It uses air cooling for the coarse aggregate

The present stage contracts are with Peter Kiewit Sons' Co. and Morrison-Knudsen Co., Inc., with each company having a concrete batching plant located near the intake and power structures, one at the upstream and the other at the downstream end.

The tunnels were driven by S. A. Healy Co. and Materials Service Co. of Chicago, Ill., using Conway muckers. Concrete for the tunnels was produced in two 2-cu. yd. Koehring mixers with a Robinson air system for transporting portland cement. Pumpcrete equipment was used on the tunnel linings, augmented by vacuum techniques.

Flood Control

The dam is on the Missouri river approximately 77 river miles north of Bismarck, N. D., in McLean and Mercer counties and 60 miles south of Minot, N. D. It will contain the waters of the Missouri river which is formed by the junction of the Jefferson, Madison and Gallatin rivers at Three Forks, Mont. From this point, the river flows eastward through Mon-

For general information on aggregates in the Missouri River Basin and construction requirements and rock products suppliers for Ft. Randall dam, see ROCK PRODUCTS, October, 1951, page 94.

Left: Bottom-dump trucks haul excavated material to the dam site. They make four to five round trips per hour and are working 18 hr. per day. Right: A 6-cu. yd. electric shovel loads one of the large capacity bottom-dump trucks

tana and North Dakota and is joined by the Yellowstone river at the North Dakota stateline. The augmented river then flows easterly and southeasterly to the dam site where it turns sharply southward toward Bismarck, N. D.

More than one-third of the drainage area of the Missouri river is above the dam site and the dam will actually control nearly one-third of the total volume of flow of the Missouri river at its confluence with the Mississippi river. Maximum and mean discharges at the dam site were approximately 275,000 and 40,000 c.f.s.

Two periods, March and June, of each year are the usual times for disastrous floods. The earlier flood is caused by rain and snow melt on the southward reaching tributaries and by ice jams on the main stem. The June floods are occasioned by snow melt in the Rocky Mountains, coincidental with the rainy season on the prairies.

Garrison dam, together with the other units of the comprehensive Missouri River Basin plan and local protection works, will prevent recurrence in the main valley of the Missouri of such disastrous floods as recently occurred.

Concrete Construction

At the time of inspection in mid-July there were two important concrete construction projects underway. One was the work related to the intake structures and control gates on the west bank of the Missouri river. The other was work related to the outlet structure, powerhouse, stilling basin, and spillway on the same side of the river. Each had its own aggregate unloading and stockpiling system and its own large capacity concrete batching facilities.

Concrete for the intake structure was being placed by two American Hoist and Derrick Co. cranes. These have a 155-ft. boom and a 150-ft. radius; they handle an 11-ton load at the maximum radius.

Work on the west bank of the "Big Muddy" relates to the power and flood control (including irrigation) phases of the project. At that site eight tunnels have been driven through a range of hills that form part of the west bank of the river. Five of these tunnels are 29 ft. inside diameter, two are 22 ft. and one is 26 ft. in diameter. All are concrete lined.

On the east bank of the river is the concrete spillway. Its capacity is such that there should be no endangerment of the earth-fill dike due to natural floods that have their source above the dam site.

Aggregates

Sand for Garrison dam is currently coming from Minnesota. Investigation of more than 50 gravel deposits in North Dakota indicated that practically all the concrete aggregate deposits in the state contained sufficient potentially alkali-reactive material to cause some disintegration of the concrete. Therefore, this aggregate was not approved for use in underwater or inaccessible structures. The coarse aggregate is coming from Greene, N. D., the riprap from Elgin, N. D., and the spalls from Goldwin, N. D.

There were indications that sand

(Continued on page 104)

Aggregates for concrete work on the intake structure on the west bank of the river come from this stockpile system. Trucks can use the hopper in the center foreground

J. L. Shiely Co. plant at Greene, N. D., is furnishing coarse aggregate for Garrison dam. (1) Primary hopper, (2) Scalping and primary crusher plant, (3) Stockpile of minus 2-in. material that is a waste product at the operation, (4) Four wet sizing screens, (5) Double-deck screen mounted over

Producing Quality Aggregates from Deposit Containing Questionable Materials

J. L. Shiely Co. plant must waste minus 2-in. material. Smaller sizes of gravel for Garrison dam produced entirely through crushing

THE COARSE AGGREGATE for Garrison dam up to the time of inspection was all coming from the gravel plant of J. L. Shiely Co., Inc., at Greene, N. D. Greene is on the Wheatline branch of the Soo railroad and is about 45 miles northwest of Minot. The gravel operation is also about 35 miles from the Canadian border. It is roughly 100 miles from Greene to Riverdale, the town established by the Corps of Engineers, U. S. Army, builder of Garrison dam.

The Corps of Engineers has ownership-control (through leases) of the main aggregate sources, and tested these deposits. Those that yielded a satisfactory aggregate were certified as such by the Corps of Engineers, and all those deposits were made available to all bidders. J. L. Shiely Co. was the successful bidder on some 856,500 tons of coarse aggregate. The leases owned by the Corps of Engineers were secured from the Department of the Interior, Fish and Wild Life Service.

Minus 2-in. Pit-Run Material Rejected

Most of the known commercial deposits of aggregates in North Dakota that were explored were said to contain objectionable materials such as reactive aggregates, manganese-iron concretions (that stain the concrete surfaces), and aggregates that caused "pops." As a general rule these deleterious substances are smaller than 1½ in. As a result prospective bidders from the Greene source were required by specification to waste all the minus 2-in. pit-run material and produce acceptable aggregate from only the plus 2-in. fraction. This wastage at Greene amounts to about 40 percent of the material sent to the processing plant. Fine aggregate for Garrison dam is shipped from Minnesota.

There are four sizes of aggregate shipped from Greene to Garrison dam. They are the usual Corps of Engineer specification as to size, but, at Greene, the two smaller sizes of aggregate are a 100 percent crushed gravel. A tabulation of the four sizes follows:

6 in. to 3 in.—Gravel with a small amount of crushed gravel
3 in to 1½ in.—Gravel with some crushed gravel
1½ in. to ¾ in.—100 percent crushed gravel
¾ in. to 4 mesh—100 percent crushed gravel

Reclaiming tunnels are 96-in. diameter steel cylinders and both piles have 62-ft. stone ladders. The two piles are No. 4-mesh to ¾-in. material and ¾- to 1½-in. material; both are a 100 percent crushed gravel product

Shallow Excavation

The gravel deposit at Greene is excavated to a relatively shallow depth, possibly to 20 ft. Roughly 50 percent of the pit is below the level of Lake Darling immediately alongside the pit, but fortunately a rib of clay between the lake and the pit keeps the inflow of water into the pit at a low figure. A 6-in. gasoline-driven Carver pump easily keeps the pit dewatered. Lake Darling is formed by the Souris river dam. The countryside around Greene

two steel silos for the two top sizes of aggregate. These are loaded directly to cars and not stockpiled. (6) Loading facilities for the two top sizes of aggregate, (7) Part of the wet sizing assembly for the two smaller sizes of aggregate, the 1½- to ¾-in. material and the No. 4-mesh to ¾-in. sizes. Both are a 100 percent crushed gravel. (8) One of the stockpiles of finished crushed gravel

is flat to gently rolling and very little overburden is handled at the Greene pit, and it is top soil.

The gravel in the Greene pit is unusual because of the uniformity of the shape and character of the larger sizes of gravel. A quick glance at the material gives the impression that these particles are all spherical. A relatively small percent of the gravel appears to be plus 6 in. in size, 40 percent is minus 2 in., and 11 percent is minus 4 mesh.

Belt Conveyor Transportation

The plant of J. L. Shiely Co. at Greene uses belt conveyors throughout for intraplant transportation of materials. Aggregate is shipped at the rate of 55 to 60 cars per day during the production season from May 1 to November 1. Stockpiles of finished material are confined to the two smaller sizes, i.e., the 1½-¾ in., and the ¾ to 4 mesh. The 6-in. and 3-in. sizes are loaded almost as soon as produced into two relatively small steel silos. Five men take care of the loading and also clean the cars.

For car switching a permanently mounted electric, double-drum hoist is used with snatch-blocks at a few spots so that cars can be moved in either direction. The car puller is used mostly when a tractor and dozer are not available. The company has a Caterpillar D-7 and a D-8 tractor for this and other work around the site. Both are equipped with dozers. Two parallel lines of trackage are for car-loading.

Wasting Rejects

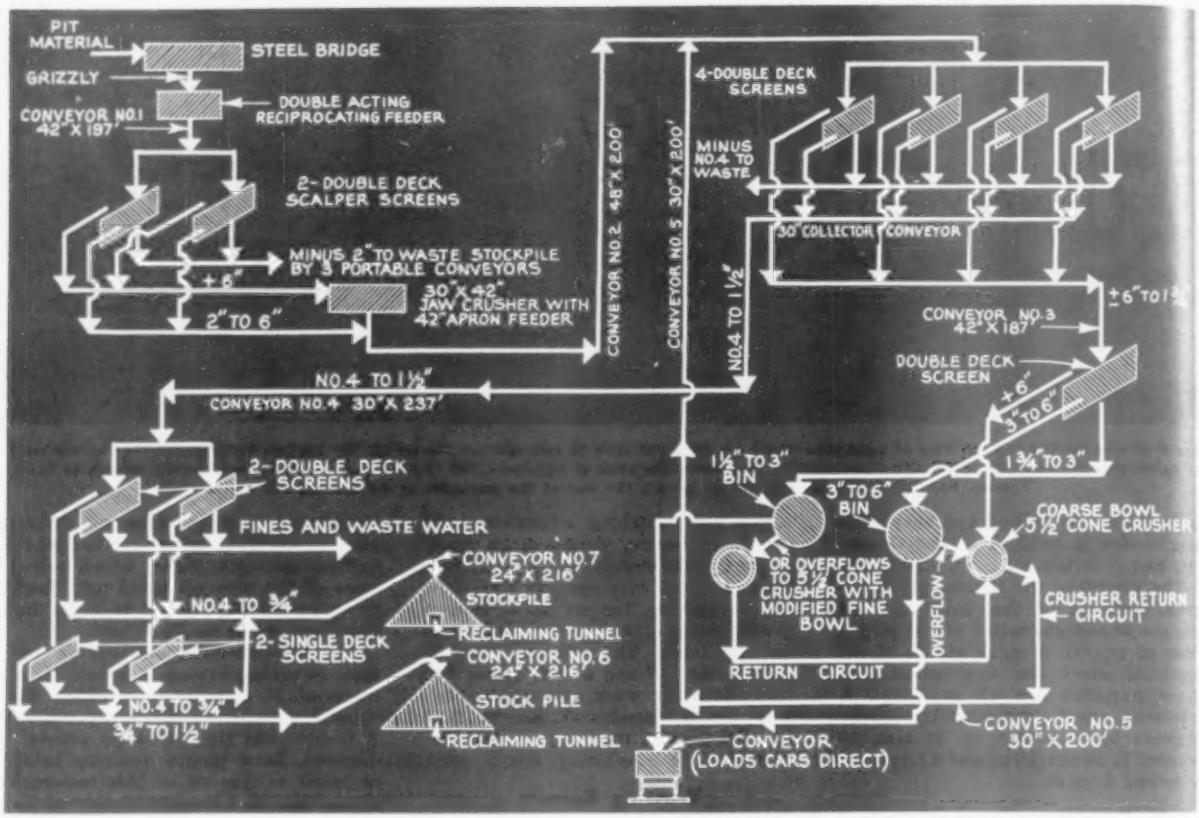
One of the striking features of the operation is the enormous pile of minus 2-in. waste material that comes from the lower deck of the scalping screens. This is elevated and conveyed to the disposal area by a 30-in. belt conveyor extended by two additional portable conveyor sections that became necessary as the top area of the pile grew. The two latter conveyors are in series and get their feed from the main belt. The portable units simply rest on the top of the pile, bolstered with an occasional piece of wood cribbing. Recently the producer installed a Stephens-Adamson swivel piler at the head pulley of the last or highest conveyor flight, which solves some of the disposal problems. There is no immediate market in sight for this material in North Dakota.

At two different locations in the final screening system a minus ¼-in. material is screened out which the wash waters carry to nearby sumps. A tractor has the job of its ultimate disposal. Sand pumps are now being installed to dispose of this material. It was said that the installation of the sand pumps would mark the first time that J. L. Shiely Co. has used hydraulic methods for material handling.

Power Generation

The plant is electrically driven with power generated by a 16-cylinder, 278-A General Motors 1600-hp., 720-r.p.m. diesel engine that is connected directly to a 1000-kw., 1250 kv.-a., 2300-volt General Electric generator. There are three transformers rated at 333 kv.-a., 2300 to 440 volts. All motors in the plant are 440 volt. The plant load draws 600 to 1000 kw.

Left: About 50 percent of the pit is below the elevation of Lake Darling, but a clay rib between pit and lake keeps the pit relatively dry. Right: The two silos at the left hold finished 1½- to 3-in. and 3- to 6-in. gravel. The two sizes are loaded directly to cars and not stockpiled. The smaller sizes of aggregate are loaded to cars from conveyors at the right which go to reclaiming tunnels under the stockpiles. The conveyor crossing over the tracks carries material from the plant to the sizing and clean-up screens for the ¾- to 1½-in. and No. 4 to ¾-in. sizes and then to stockpiles



Flowsheet of J. L. Shiely Co., Inc., operations at Greene, N. D.

from this diesel-electric set depending on plant requirements and coarseness of the material.

In the plant are eleven Tyler screens. Three are F-800, double-deck; six are F-600, double-deck; and two are F-300, single-deck. The primary crusher is a 30- x 42-in. Pioneer jaw, and for secondary crushing there are two 5½-ft. Symons cone crushers. One of the cones has a standard coarse bowl, and the other is a shorthead with a modified fine bowl.

Loading in the pit is by a Manitowoc power shovel that carries a 2½-cu. yd. bucket. It is driven by a Caterpillar diesel. Also for pit loading is a P&H shovel with 2½-cu. yd. bucket that is powered by an Atlas diesel. Four 25 FDT Euclid bottom-dump trucks haul from the pit to the truck hopper at the plant. The round trip haul is about 1000 ft. over fairly easy grades.

Processing of Aggregate

The trucks unload through a slot parallel to the long axis of the bridge over the truck hopper. Just below, and sloping away from the plant (toward the pit), is a heavy 18-in. spaced steel grizzly. Any oversize material drops back to the pit and one of the tractors pushes the oversize out of the way with a dozer. The fines fall to a bin under which is a 48-in. double-acting, reciprocating plate feeder that serves belt No. 1 (for details on the important conveyor belts in the plant, see the flow diagram). All the conveyors are Stephens-Adamson.

Conveyor No. 1 serves two scalpers that operate in parallel. They are the F-800's and are double-deck, operating dry. The top decks have 6- x 7-in. square openings and 2-in. square wire mesh for the bottom deck. The minus 2-in. material goes to the waste pile via the previously mentioned conveyor system. The oversize falls to a hopper under which is a 42-in. heavy-duty Pioneer apron feeder that serves the jaw crusher. The 2- to 6-in. size from

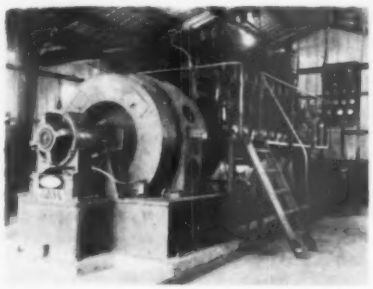
Left to right: J. L. Shiely, Jr., vice-president; Frank Googins, plant superintendent; Sam B. Taylor, office manager; and Walter Ecklund, plant foreman

between screen decks joins the crushed product from the primary jaw crusher, and is conveyed to a battery of four wet, F-600 screens also operating in parallel. These screens have top decks of 1¾-in. wire, and bottom decks of 3/16- and ¼-in. wire, some of which is slotted. The undersize from the lower deck, along with the wash water, is pumped to waste.

The 6- to 1¾-in. size is collected on a 42-in. belt and is delivered to a double-deck screen mounted over two steel silos, each of which holds about 250 tons. This screen has 6- x 6½-in. openings, and the bottom deck has 3- x 4-in. openings. The material that is retained on the top deck of this screen is chuted to the 5½-ft. standard coarse bowl cone crusher. The 1½- x 3-in. material goes to its steel silo, or overflows to the 5½-ft. shorthead cone crusher that has the modified fine bowl. The material in the two bins is loaded directly to open top cars by a belt conveyor system. The crushed product from the two cones is collected and returned to the four wet screens (F-600).

The material from between the decks of these screens (No. 4 mesh to 1½ in.) is collected and belted to two wet F-600 screens that operate in parallel. They have ⅞-in. and 13/16-in. top decks and ¼-in. wire bottom decks. Material from the top decks passes over two F-300 single-deck clean-up

A bottom-dump truck on bridge at unloading hopper. The grizzly is under the trackway with the double acting reciprocating plate feeder below that



Power for the plant is supplied by a 1600-hp. diesel connected directly to a 1000-kw., 1250-kv.-a., 2300-volt generator

At left foreground are the four screens that follow the primary crusher. The steel silos at right are for 1½- to 3-in. and 3- to 6-in. sizes

The truck ramp to the hopper at the primary feeder is at the right, two scalping screens and primary crusher are shown at the left. The stockpile of waste material is in the background. The portable conveyor sections carrying waste material rest on top of the pile

screens. This size (¾ in. to 1½ in.) is conveyed by belt to a stockpile that is provided with a 62-ft. stone ladder at the unloading point. The material on the lower deck (No. 4 mesh to ¾ in.) of the F-600 screens is stockpiled and it also has a 62 ft. high stone ladder at the unloading end. The minus ¼-in. material and wash water from the lower deck are wasted.

Under each of the two stockpiles is a 96-in. diameter Armco steel reclaiming tunnel, both of which are 125 ft. long. A 24-in. wide reclaiming belt is in each tunnel. The gates used in the tunnels are company-made.

The Corps of Engineers maintains a small testing laboratory at Greene in a building provided by J. L. Shiely Co. All aggregates shipped are accepted or rejected at point of shipment.

Conveyor Belts

Some of the more important conveyor belt characteristics are as follows: (See flow diagram)

Belt No. 1—42 in.—197 ft. centers
No. 2—48 in.—200 ft. centers
No. 3—42 in.—187 ft. centers
No. 4—30 in.—237 ft. centers
No. 5—30 in.—200 ft. centers
No. 6—24 in.—216 ft. centers, 62-ft. stacker
No. 7—24 in.—216 ft. centers, 62-ft. stacker

Other Shiely Operations

J. L. Shiely Co. is active in the production of aggregates, particularly railroad ballast, in the upper Missouri River Basin and in Minnesota. Besides the Greene, N. D., operation it has the Snelling Ave. plant in St. Paul, Minn., and the following other operations that are owned outright by the company or as cooperative ventures with other producers.

At Mendota, Minn., the company has a crushed limestone and riprap operation that also produces some building stone, veneer, etc. At St. Cloud, Minn., is a crushed granite operation that supplies the Northern Pacific railroad with ballast for all points east of Montana. The minus ¾-in. granite finds use in black-top work. Very little concrete aggregate is marketed from the St. Cloud operation. The granite operation operates under the name of Shiely-Petters Crushed Stone Co. and is a joint venture with Al C. Petters Co.

The Guaranteed Concrete Co. of St. Paul, Minn., is owned outright by Shiely. This part of the business is directed by James M. Shiely and Robert Shiely.

The Greene operation is under the joint direction of vice-president J. L. Shiely, Jr., and chief engineer S. T. Harrison. Each spends alternate half-months at Greene. Frank Googins is plant superintendent, Walter Ecklund is plant foreman, and Sam Taylor is office manager. Mr. Ecklund formerly operated walking Monighans at the pit near Redding, Calif., that supplied Shasta dam with aggregates over a 10-mile long belt conveyor system.

The head office of J. L. Shiely Co. is in St. Paul, Minn. The officers of the company are: J. L. Shiely, president; A. R. Shiely, vice-president; J. L. Shiely, Jr., vice-president; J. M. Shiely, vice-president; E. W. Alm, treasurer; and H. J. Farrell, secretary.

Gravel Plant Sold

FREDERICKTOWN SAND AND GRAVEL Co., Fredericktown, Ohio, has been sold to Clarence G. Tugend, former superintendent of State Highway Division No. 3, and Carl Stander and son, Richard, operators of Mansfield Asphalt Co., all of Mansfield, Ohio. Roy Rice, former owner, had operated the plant since May, 1946, when he purchased it from France Stone Co. of Toledo, Ohio.

The sand belt unloads in center foreground. The sand is quite wet and is recast by clamshell for drainage and mixing. The center structure contains the hydraulic classifier and a three-deck, wet screen; to the right are the two cone crushers; between the crushers and the classifier are the rod mills

Producing Sand for Garrison Dam

Becker County Sand and Gravel Co., Detroit Lakes, Minn., meets specifications by using rod mills for additional fines and rising current hydraulic classifier for sizing

By WALTER B. LENHART

FINE AGGREGATE for Garrison dam is currently being shipped from the plant of the Becker County Sand and Gravel Co., Detroit Lakes, Minn., about 40 miles east of Fargo, N. D. The deposit is in typical Minnesota glacial area.

The plant, designed and built by the company at Detroit Lakes, is especially noteworthy because of the use of a new type of hydraulic sand classifier known as the "SuperSorter" built by Deister Concentrator Co. The plant is the first aggregate plant to use this piece of equipment, although several have been used in coal processing plants.

The deposit at Detroit Lakes is part of the 400-acre holdings of the Hallett interests and to reach it a 3½-mile spur from the Northern Pacific railroad had to be built. The plant is of wood construction, quite simple in design, yet has a capacity of about 400 t.p.h. Several sizes of coarse gravel are prepared and stockpiled over a reclaiming tunnel and sold over a large area in western Minnesota and eastern North Dakota for concrete pavements, bridges, dams, commercial buildings and other structures.

Rod Mill for Fines

The gravel in the deposit runs from 20 in. in diameter down and is more uniform in size than the sand. In about 100 acres of the deposit the material runs coarse, up to 30 percent ranging from 5 to 20 in. When operating from the coarse area the crusher is taxed to capacity. There is practically no "pan" or minus 200-mesh material in the pit-run, and the plus 200- minus 100-mesh sizes are in the 2½ percent range. To make up this deficiency, two rod mills were installed, but at the time of inspection only one was in use. The mills are both 6- x 12-ft., Allis-Chalmers, trunnion fed and trunnion discharge, rod mills but the operators changed them to peripheral discharge mills by cutting four holes, each about 2 x 4 in., in the shell of the rod mills. These holes are about equally spaced around the center of the drum and midway between the two end castings. Later it was found that two ports were sufficient so the other two were closed off. There is no grid or screen over these openings. Chutes were improvised to feed the mill from the ends.

Loading in the pit is by a 2½-cu. yd. Manitowoc power shovel and it serves a fleet of three, 13-cu. yd. Euclid bottom-dump trucks. The haul to the plant is about 200 yd. over easy grades.

The primary crusher is a 24- x 36-in. Pioneer jaw crusher fed from the track hopper by a suitable feeder. The scalper screen is a 5- x 12-ft. double-deck Simplicity screen that operates in closed circuit with two Symons cone crushers. One of the cones is a 4-ft. and the other a 3-ft. unit.

The second vibrating screen in the plant is a three-deck, wet, 5- x 12-ft. Simplicity and the feed material to the SuperSorter is obtained from the lower deck of this screen. This screen has 3/16-in. wire on it and the pulp from the upper portion of the screen flows to the hydraulic classifier. The sand from the low end goes directly to Eagle Iron Works dewaterers. The dewaterer also prepares the rod mill feed. The coarse gravel goes from here to a third vibrating screen, a 4- x 12-ft. two-deck unit, over the reclaiming tunnel, where it is sized.

Rising Current Classifier

The Deister SuperSorter is an eight-celled unit assembled in a single line. Each of the eight cells has a conical bottom section and a glass inspection window in its side. The eight cells are in series and the pulp from the upper end of the Simplicity screen flows to the launder section of the

classifier where it starts flowing horizontally toward the opposite end. Some water is added in the bottom of the launder section at the head end to maintain fluidity and move the sand along. Upon reaching the pocket above the first cell, it encounters the upward rising current of water from that compartment. Only the largest or heaviest particles are able to settle against the rising current. Particles having a settling rate less than the upward velocity in the column in No. 1 cell are carried over to the next cell which is regulated to have a lower velocity of rising current in the sorting column. The fines from each compartment are carried on to succeeding cells until all particles have either settled out or overflowed to waste. Clay slimes and organic material overflow the launder section and are flumed to waste.

Water velocity in the sorting column of each cell is controlled by a pinch valve between the main water header and the cell. Small diameter columns are used at the head end where high velocity is required and large columns at the overflow end where low velocity is needed. Screen analysis of each of the cells is shown in Table I.

It was said that the sizing in each column was normally 75 to 90 percent retained on two successive screen sizes.

The hydraulic classifier handles from 125 to 150 t.p.h. of minus 8-mesh sand and requires about 2000 gal. of water per min. The plant uses a total of 3000 g.p.m., all of which is pumped from nearby sources by a Fairbanks-Morse pump.

The discharge mechanism of each of the eight cells in the hydraulic sorter is one of the noteworthy developments as it permits precise control on the rate of draw-off from each cell. At the low end of each cone is a rubber nipple through which the sand is discharged. This is closed by an ingenious constrictor valve mechanism that at preset intervals pinches and closes the rubber sleeve. This constrictor mechanism functions from 16 to 20 times per min., and the percentage of open and closed time may vary from 100 percent closure to 100 percent open time. A $1\frac{1}{2}$-hp. General Electric motor through a small D.O. James Co. speed reducer furnished all the power for the opening and closing mechanism with a single reciprocating arm serving all eight of the constrictor valves. A small air cylinder is at each of the constrictor valves and its purpose is to switch the valve into an operating, or non-operating position. A small Curtis air compressor furnishes the amount of air necessary.

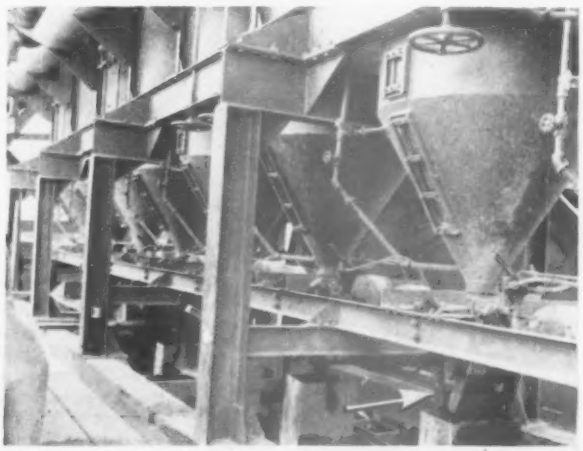
The SuperSorter is mounted on a wood structure of modest height so that pulp can flow to and from it by gravity. An attendant is on the platform alongside the unit and through the glass windows he can observe the action within each of the columns. From data obtained from frequent screen analysis, the operator can adjust the amount of rising fresh water in the columns, adjust the opening size in the rubber outlets, the openings per min., turbulence, and other factors, so as to get the desired prod-

The hydraulic sand classifier is in the center. The structure to the left houses a three-deck screen that feeds to the classifier and to the dewaterers. The scalper screen and crushers are in the background at the right

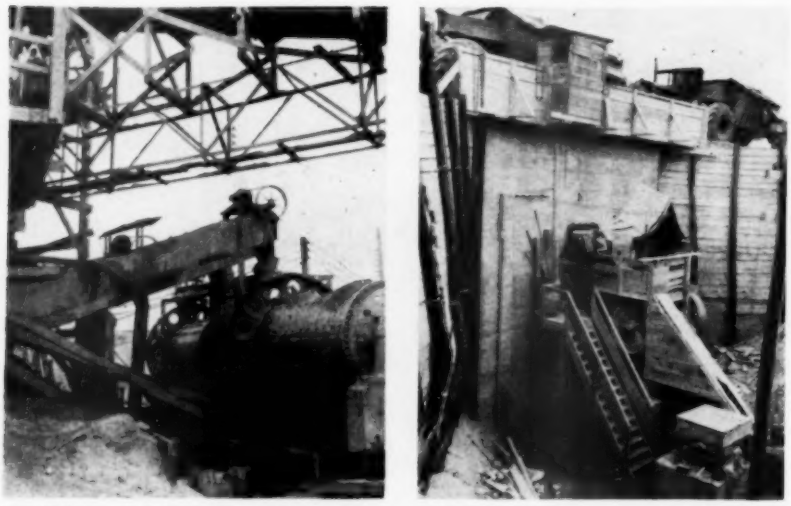
Table 1: Screen analysis of hydraulic sorter spigot products

Feed—Minus 8-mesh sand
Feed rate—136 t.p.h.

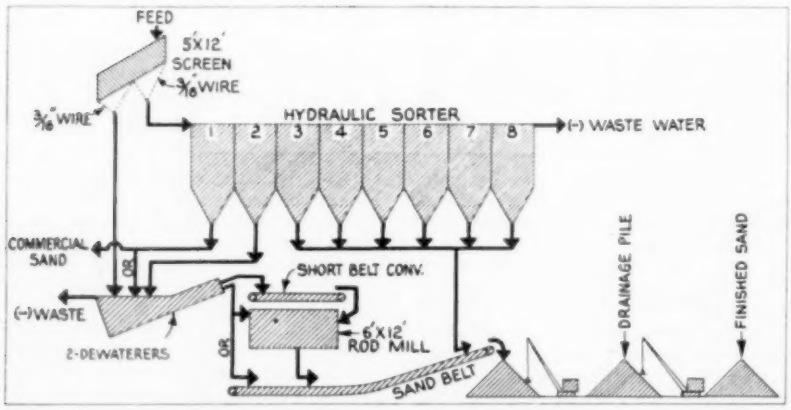
Sieve No.	Spigot No. 1	Spigot No. 2	Spigot No. 3	Spigot No. 4	Spigot No. 5	Spigot No. 6	Spigot No. 7	Spigot No. 8	Overflow
8	0.8	0.5	0.0	—	—	—	—	—	—
16	51.1	29.5	17.5	4.2	0.9	0.0	0.2	—	—
30	40.2	48.7	48.8	32.0	18.2	5.4	0.8	0.8	0.4
50	7.2	19.7	30.6	48.9	59.4	40.2	7.1	0.6	1.0
100	0.7	1.6	3.0	14.4	20.8	51.2	63.5	43.5	11.9
200	—	—	0.1	0.5	0.7	3.0	25.8	47.0	45.0
Pan	—	—	—	—	—	0.2	2.6	8.1	41.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0



Left: The eight-cell classifier receives pulp from the upper end of the three-deck, wet screen at left where it starts flowing horizontally toward the opposite end. Right: The sand from each cone of the sorter discharges at preset intervals through a mechanically operated pinch valve shown by the arrow. Note the glass windows in the cone sides for inspection during operation



Left: Only one of the rod mills was in operation at the time of inspection. It was originally a standard discharge machine but was made over into a peripheral discharge unit. The dewaterer above the rod mills dewaters the sand before it goes to the mills. Right: Bottom-dump trucks unloading to hopper serving the primary crusher



Flow sheet for Becker County Sand and Gravel Co. plant

Top: Cliff Anderson, plant foreman, left, and J. M. Bentley, plant manager. Bottom: F. E. Warner, superintendent of operations, left, and Len Kath, office manager

uct. However, once the machine is set, it performs smoothly to give a uniform product and to-date it has met the rigid specifications of the Corps of Engineers at Garrison dam.

Specifications for sand gradation for Garrison dam are:

Sieve, U. S. Std. sq. mesh Retained Passing	on	Limits, percent by weight Min.	Desired	Max.
—	4	0	0	5
4	8	5	10	15
8	16	10	15	20
16	30	20	25	30
30	50	20	25	30
50	100	12	17	22
100	200	3	5	7
200	Pan	1	3	5
Fineness modulus				2.52

The maximum permissible variation in the fineness modulus is from 2.35 to 2.75; however, after an average fineness modulus is established, the fineness modulus from at least 90 percent of the samples tested shall not vary more than 0.10 from the average.

On a sand recovery unit of this type eight sizes of sand can be produced and they can be recombined (or re-

Loading 13-cu. yd. bottom-dump trucks in the pit for a 200-yd. haul to the plant

processed or rod milled) in any proportions desired. At the Becker County Sand and Gravel operation this is carried out by sending part of the coarse fraction in cell No. 1, and all of the sand in No. 2 compartment, to the Eagle dewaterers and thence to the rod mill and ground to 100- and minus 200-mesh size. The remaining fraction from the first cell can go as commercial sand via the dewaterers, there being two of the latter. The sand from the other six cells, along with the rod mill discharge, goes to the sand belt and to a shallow storage pile. A 14-in. Victaulic coupling is a part of the header pipe to the Super-Sorter. Since the material on the sand belt is quite sloppy a higher than normal speed on the off-bearing belt is required. Stationed near the unloading end of the sand belt is a Northwest clamshell and the wet sand is bailed back to a conical storage pile for drainage. No special foundation or drainage facilities are under this pile. After a drain pile has been built up it is often recast a second time as this helps further drainage and reduces segregation. The sand is tested in the pile by a Corps of Engineers representative and after acceptance is shipped. The sand is loaded by clamshell rigs which are 1¼ and 1½ cu. yd. Car switching is by an HD-19 Allis-Chalmers tractor and dozer. Loading into trucks is done by a rubber-mounted, Lull end-loader that is mounted on a Case chassis.

The Becker County Sand and Gravel Co. is an affiliate of the Hallett Construction Co. which operates a sand plant at Hawarden, Iowa, which supplied much of the sand for Ft. Randall dam in South Dakota. A second affiliate of the E. W. Hallett interests is the Central States Construction Co. and between these three companies a total of 22 aggregate production plants are operated. Most of these are in Minnesota and Iowa with some in North and South Carolina and in Ohio. President of the companies, E. W. Hallett, is well-known in highway and other construction fields.

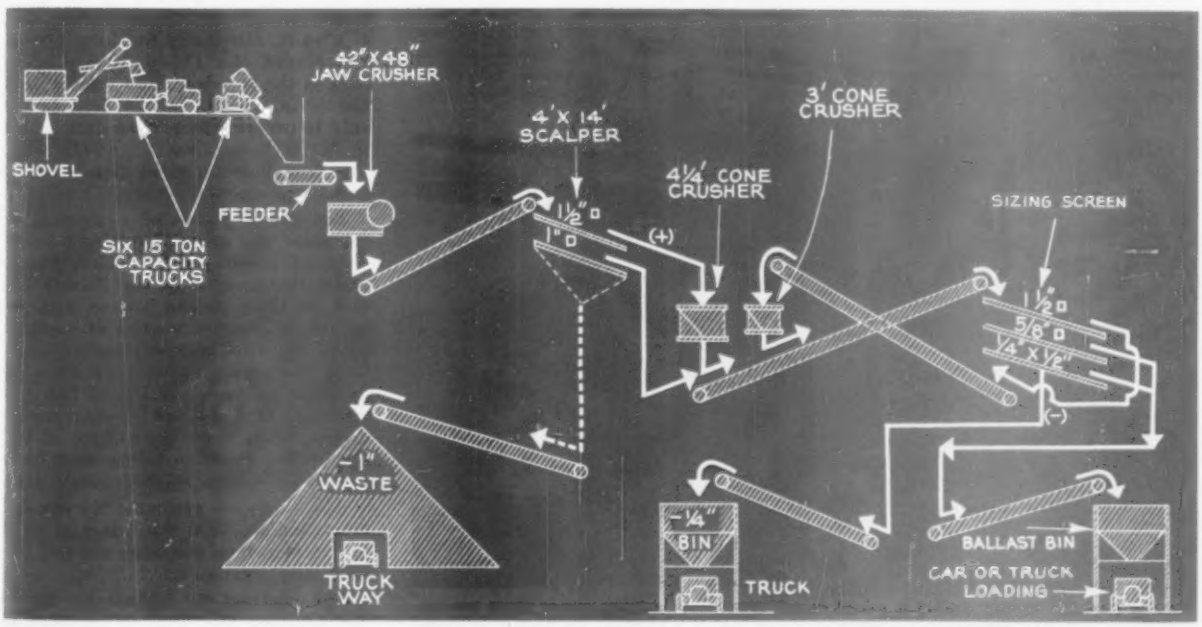
J. M. Bentley is local manager for the Becker County Sand and Gravel Co. with offices at the plant. F. E. Warner is superintendent of operations, Cliff Anderson is general foreman, and Len Kath, office manager. Testing engineer for the Corps of Engineers is George Vincent.

Ballast plant of Morrison-Knudsen Co., Inc. The primary crusher is in the center background. In the left foreground the double-deck scalping screen is over two secondary cone crushers. The conveyor at far left handles the waste material. At extreme right is the three-deck sizing screen for ballast

PRODUCING GRAVEL RAILROAD BALLAST

PRODUCTION OF RAILROAD ballast is an important subject in the upper Missouri River Basin and when Morrison-Knudsen Co., Inc., one of the nation's largest contracting firms, went into the business of producing ballast for the Great Northern railroad there was considerable comment both in railroad and in ballast producing circles. Some thought that possibly a new trend in the rock products and contracting fields was being set because they said in effect, "Why should a great contracting firm like Morrison-Knudsen Co., Inc., go into the ballast game, especially in such a relatively modest way as at Blaisdell, N. D., unless the contractor had his eye on a bigger object. Namely, to *supply* the ballast and to *place* it." As Morrison-Knudsen are, and have been, large aggregate producers it indeed would be a new trend if the aggregate producer went into the business of placing and tamping ballast under railroad ties.

The new plant at Blaisdell is supplying a gravel and crushed-gravel ballast to the Great Northern railroad. For years ballast specifications



Flowsheet of ballast plant

A three-deck, dry screen is the sizing screen for the minus 1½-in., plus ¼-in, ballast. Note the heavy load and steep pitch of the screen

of most of the railroads spanning the Northwest called for a plus ¾-in., minus 2½-in. crushed rock. When the Blaisdell plant started shipping a minus 1½-in., plus ¼-in., gravel ballast, the comments became still more pronounced, for here was definitely a new trend for the railroads in the area.

When Morrison-Knudsen Co., Inc., who are one of the prime contractors on Garrison dam in North Dakota, go into the production of a rock products commodity there is usually no shortage of good equipment to do the job. The Blaisdell operation is no exception for the project from pit to the final loading bins is of sufficient size to produce material fast and economically.

Another striking thing about the Blaisdell operation is that all the minus 1-in. material is wasted, and, due to the character of the pit-run, this means that 65 percent of the sand and gravel going to the plant is bypassed and not used as a source of ballast. We use the word "bypass" because this minus 1-in. material is not a waste in the true sense of the word; instead, it is placed in large piles adjacent to nearby railroad switching facilities with the intention of using it as a quick source of fill material in the event of a washout on any of the company's lines. The plant is producing 1500 cu. yd. per day of finished ballast.

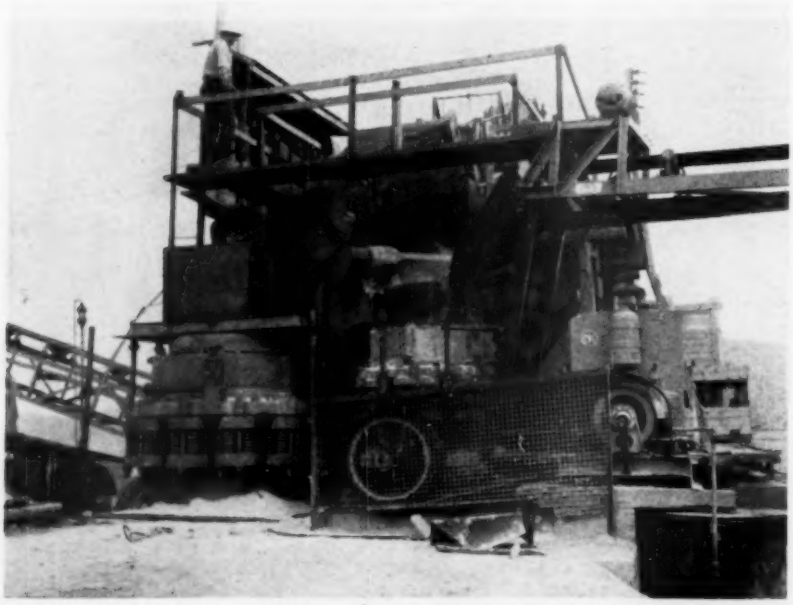
The waste minus 1-in. material is loaded into trucks and hauled to stockpiles. The material will be used as fill in case of washouts along the rail lines

In the pit a 2½-cu. yd., 80-D Northwest shovel loads to a fleet of six Model 27, 15-ton capacity, Euclid trucks. These unload to a hopper under which is an apron feeder that serves a 42- x 48-in. Traylor jaw crusher. As the pit-run aggregate is of relatively small size the crusher is not taxed to any large degree. The material is next conveyed by belt and passed over a 4- x 14-ft. double-deck, dry Lippman scalping screen that has a 1½-in. top deck and a 1-in. lower deck, both of wire. The minus 1-in. material is conveyed by belt to a ground storage pile under which is a truckway and the material trucked to the previously mentioned storage piles along the railroad spur. For secondary crushing there is a 4¼-ft. and a 3-ft. Symons cone. The latter is in closed circuit with the three-deck, dry, 4- x 14-ft. Simplicity finishing screen. The screen has 1½-in. square openings in the top deck. The middle deck has ⅝-in. openings; this deck serves only to protect the bottom deck which is ¼- x ½-in., No. 11 gauge wire. The flow diagram gives details of the ballast production set-up.

The major pieces of equipment in the plant are driven by UD-24 International diesels, and William Clark, plant manager, says the diesels are now in their second season and required no repairs worthy of mention up to the time of the plant's inspection. The conveyors in the plant were supplied by Conveyor Co. of Los Angeles, Calif., and are electric motor driven. There are two D-13000, 75-kw. Caterpillar diesel-electric sets on hand for miscellaneous electric power uses.

Steel bins are available for car and truck loading but the latter is used only when open gondolas are not immediately available.

The contract for ballast by Morrison-Knudsen Co., Inc., is expected to run for three years.



Material from the primary crusher is passed over a double-deck scalping screen above two secondary cone crushers. The minus 1-in. material is conveyed to a truckway for hauling to ground storage piles

Special dozers facilitate surface mining of riprap for Garrison dam by Peter Kiewit Sons' Co.

Riprap is loaded into open top railroad cars from a stockpile along the tracks

Riprap Excavated from Surface Deposits

GARRISON DAM WILL REQUIRE approximately 650,000 cu. yd. of riprap. This material is used near the wave line and on the upstream face of the earth-fill dam. Specifications are such that 10 percent of the riprap can be minus 8-in. cubes with 4-ft. cubes being maximum.

Some "spalls" are used on the upstream face. These extend downward from the toe of the riprap and all the spalls (or gravel) are below the waterline. The spalls used appear to be a gravel up to 6-in. sizes with a minimum of fines. The spalls are being shipped from Goldwin, N. D., about 150 miles east of the dam site, by Hector Construction Co.

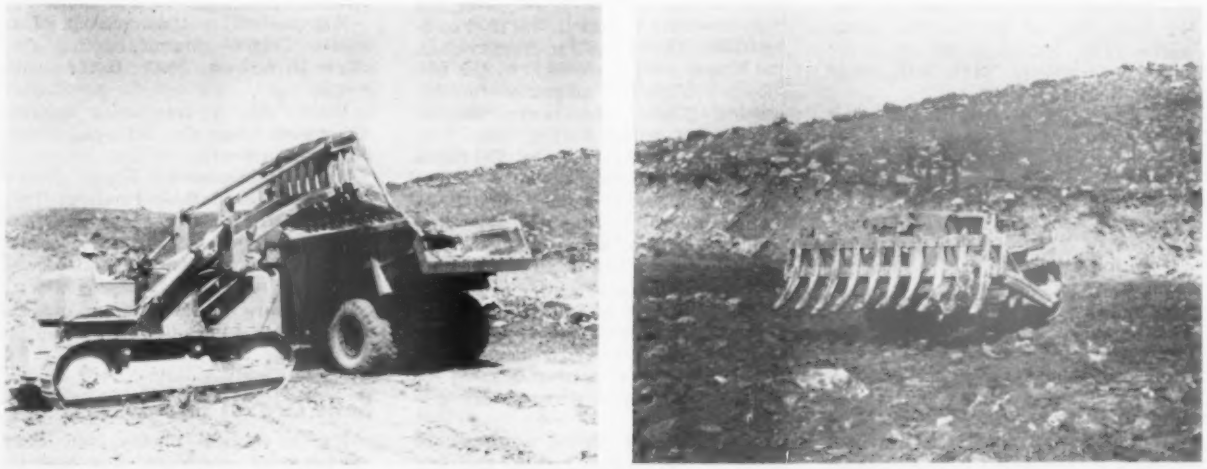
The riprap is being shipped from Elgin, N. D., under a contract held by Peter Kiewit Sons' Co., Omaha, Neb., who with Morrison-Knudsen Co., Inc., are the prime building contractors for Garrison dam.

Source of Riprap

Scattered throughout the western part of North Dakota are many so-called "buttes." They rise several hundred feet above the surrounding flat to gently rolling countryside. These buttes are remnants of a vast plateau that eons ago blanketed the area and later erosion removed all but these ancient, flat-topped peaks which remained because they were capped by a harder material. Between the almost vertical-sided buttes and the flat country that stretches for hundreds of miles are intermediate, rounded domes that are eroded remnants of buttes, and scattered over the top surface of these rounded hills is the rock that once was the capping of the buttes.

Near Elgin, N. D., are three such eroded buttes closely bunched and the capping, a hard quartzite. As the soil underneath was eroded away this quartzite capping broke off in relatively large, flat fragments and remains today as the source of riprap that is being shipped by Peter Kiewit Sons' Co. to Garrison dam.

The method used to recover the riprap was built about this relatively rare and unusual condition; however, variations of the technique could pos-



Left: A forked end-loader-dozer loads the riprap into end-dump trucks. Right: A forked dozer blade is used to sift out the coarse rock from the earth and fines. Note the broken pieces of hard quartzite that are scattered over the hillside behind the tractor

The tractor and dozer in the background is pushing quartzite rock and earth down to the toe of the hill where the forked-dozer tractor sifts out the earth and fines and pushes the material into convenient windrows. The rock is then loaded into trucks with a forked front-end loader

The maximum size riprap allowed is 4-ft. cubes. Larger riprap is broken at the loading pile next to the railroad with a 3800-lb. drop ball

sibly be used by producers of riprap in other sections of the country where the rock is quarried in conventional manner.

At Elgin, the top 3 ft., approximately, of the domes are pushed downhill to the toe of each butte by a Caterpillar tractor equipped with a conventional blade. This 3 ft. is a mixture of large fragments of quartzite, several feet thick, and earth. This tractor pushes the material into irregular windrows at the foot of the relatively flat hill. A second tractor of the same manufacturer that has a forked dozer blade of very heavy and special construction next goes through the windrows and literally "sifts" out the coarse rock from the earth and fines. There is very little of the latter. The second forked blade or "sifter" also pushes the riprap into piles so that an HD-19 Allis-Chalmers, equipped with a slightly different type of forked end-loader-dozer, can load the riprap to a fleet of Euclid rear dump trucks. The forked sifter and the forked end-loaders were both made by Tractomotive Corp.

There are usually two domes being worked at one time. One of these operations is mere preparatory work, i.e., pushing the earth and rock to the toe of the rounded butte and getting some material ahead for the later operations.

The three domes being worked are about ½-1 mile from the Northern Pacific rails and the Euclid trucks haul the material to the switch and pile the rock parallel to the rails. Any large pieces can be broken with a 3800-lb. spherical drop ball that is handled by a Northwest crane. An 80-D, Northwest shovel loads the open top cars. R. E. Osborn is superintendent at Elgin for the Peter Kiewit Sons' Co.

N.C.S.A. Safety Competition

THE NATIONAL CRUSHED STONE SAFETY COMPETITION of 1950 experienced its best safety record in the 25-year history of the contest, according to the Bureau of Mines report. Although the injury record of the competing operations has not been improved in each competitive year, there has been a definite long-term improvement shown over the 25-year span of the contest. The injury severity rate of 3.874 days lost per 1000 man-hours of work during 1950 is 29 percent less than the corresponding severity experience of the first competition of 1926. The injury frequency rate of 24.828 per million man-hours worked showed an even greater improvement —a reduction of 42 percent over the 1926 rate.

The No. 1 quarry of Columbia Quarry Co., Columbia, Ill., won the highest safety honors in the 1950 competition. This limestone quarry won the bronze plaque provided by the *Explosives Engineer* magazine for operating 228,758 man-hours without a lost-time injury during 1950. This was the fourth time the Columbia quarry has won top honors.

The Kimballton underground limestone mine of The Standard Lime and Stone Co., Kimballton, Va., ranked second in the 1950 contest, working 172,964 man-hours without a lost-time injury. The No. 1 quarry of Callanan Road Improvement Co., Coeymans, N. Y., won third place safety honors with its accomplishment of 115,412 man-hours without any disabling injuries.

The following plants, arranged in order of hours of exposure, also had injury-free records and were awarded Certificates of Honorable Mention.

North Branford No. 7 trap rock quarry, The New Haven Trap Rock Co., North Branford, Conn.; 95,890 man-hours.

Gibsonburg lime and limestone quarry, The Kelley Island Lime and Transport Co., Gibsonburg, Ohio; 88,433 man-hours.

Watertown limestone quarry, The General Crushed Stone Co., Watertown, N. Y.; 82,495 man-hours.

Martha limestone quarry, Marquette Cement Manufacturing Co., Lebanon, Tenn.; 74,075 man-hours.

Oriskany Falls limestone Plant No. 5 quarry, Eastern Rock Products, Inc., Oriskany Falls, N. Y.; 71,588 man-hours.

Auburn limestone quarry, The General Crushed Stone Co., Auburn, N. Y.; 68,848 man-hours.

Jordanville limestone quarry, The General Crushed Stone Co., Jordanville, N. Y.; 64,295 man-hours.

Middlefield No. 1 trap rock quarry, The New Haven Trap Rock Co., Middlefield, Conn.; 53,683 man-hours.

Marquette limestone quarry, Marquette Cement Manufacturing Co., Cape Girardeau, Mo.; 45,112 man-hours.

Plant No. 4 trap rock quarry, Southwest Stone Co., Knippa, Texas, 35,759 man-hours.

Prospect limestone Plant No. 6 quarry, Eastern Rock Products, Inc., Prospect, N. Y.; 27,072 man-hours.

McCoy limestone quarry, Warner Co., Bridgeport, Penn; 26,416 man-hours.

Pearisburg hydrated lime quarry, Ripplemead Lime Co., Inc., Ripplemead, Va.; 12,398 man-hours.

Sells Gravel Business

RAY A. CONRAD, Shelby, Neb., after 15 years of operation, has sold his gravel business to Overland Sand & Gravel Co., Stromsburg, Neb.

EVALUATION AND DEVELOPMENT OF KILN EFFICIENCIES

Part VIII. Losses in heat utilization due to CO_2 from stone and H_2O in fuel

By VICTOR J. AZBE*

THIS MONTH'S ARTICLE includes discussions of conditions and losses due to CO_2 escaping from stone, of free and combined H_2O of the fuel and that resulting from combustion of hydrogen. Control of the loss through minimization of calcining zone terminal temperature differential also receives attention.

In connection with all this we must be able to distinguish the different allocations which apply to the various portions of the potential heat stream of the fuel. There is the high heat value and the low heat value. In the case of high heat value, the moisture is condensed in the calorimeter and latent heat of water vapor is released. In the case of the low heat value this amount is deducted by calculation. There is no adjustment for other variations, such as different amounts of air required per 1000 B.t.u.'s generated by carbon, hydrogen and combination of carbon and hydrogen, and no adjustment for the high specific heat of H_2O. Thus the high heat value or even the low heat value does not reveal completely the true possible limemaking potential of a fuel.

Another consideration is the source of the heat loss. It may be heat in the fuel, which may be only partly released as in combustion to CO, or not at all due to escape of hydrogen or hydrocarbon gases. Then it may be heat which has been developed which may fall into two categories being either too low in elevation to cause calcination or being heat capable of calcining. Then we should distinguish between heat not transferred and still contained by the general stream of gases and heat which has been transferred. Even transferred heat has different values, such as that which was transferred to the kiln walls and is subject to loss through the wall, and heat which has been transferred directly or indirectly to the material. Finally, there is heat which has been developed in situ through exothermic reactions.

Such differentiation is important. It is all heat, but the loss of one can be far more serious than the loss of another. This may be best illustrated by the extreme example of a 400-ft. rotary kiln which is operated with the last 75 ft. completely unlined. In this last 75 ft. there is a great loss of heat, but this terminal heat is of relatively little value, in this case. Operating in such a manner results in a much lower temperature of the gases, much simpler arrangement and operation of the induced draft system. If the excessively long kiln had been lined throughout, heat would have been saved but kiln performance would hardly have been improved and the escaping gases would have been hotter, bringing on induced draft system complications.

We must realize that not all theoretically available heat is practically transferable. A kiln cannot be 100 percent efficient since every single function is in some degree deficient and in many respects the efficiency of the various functions is interdependent, making the grand total over-all kiln efficiency a summary of performance of an infinite number of individual processes.

Temperature Differential

Then there is this important matter of temperature differential. The three most important of these are: (1) the differential through any single piece of calcining lime as indicated by "A" in Fig. 31; (2) the differential "B" through the bed of the stone and lime; and (3) the differential between the bed and the average temperature of the flowing gases "C."

In one respect, the higher the kiln efficiency, the greater the heat loss, because heat is carried from the calcining zone by the CO_2 escaping from the stone. The loss will be proportionate to the carbonate content of the stone and to the ratio of carbonate calcined per unit of fuel burned. It also depends on the temperature of the gases leaving the point in the kiln where calcination begins, and not on the temperature of calcination at the point of CO_2 release or on the kiln waste gas temperature.

Fig. 31 is drawn for the approximate mid-section of the calcining zone of an ordinary rotary kiln where the gases are likely to be at 2500 deg. F. The surface material of the outer periphery is mostly calcined at a temperature of 2000 deg. F. thus giving off but little CO_2 of which there is more from the adjacent layer, deeper within the bed.

In a perfect kiln the origin of the sensible heat of escaping CO_2 would be "heat of low elevation" of 1500 deg. F. and less, "transferred" in the preheating zone. It may be assumed that the stone in its passage through the preheating zone has two entities, CaO and CO_2. The heat of preheat that it gathers in as CaO is eventually delivered to the cooler, which if it is recuperatively effective, recovers and returns the heat to the kiln, thus greatly enhancing kiln efficiency and performance. In effect, heat of low temperature elevation such as was spent and only capable of low temperature preheating of stone is regenerated by the cooler into heat of possible high temperature elevation.

This is quite different in the case of heat of preheat of the CO_2 component of the stone. In theory, whatever heat the CO_2 carries from the calcining zone into the preheating zone is returned by the preheated stone back to the calcining zone. But practically the normal products of combustion have ample heat to preheat so whatever heat CO_2 returns is wasted, which is more serious than it appears since it means losing heat which has been transferred and a rotary kiln tends to be deficient in transferred heat.

Zonal Overlap

But there is still more to all this; the matter of zonal overlap enters. Not all of the stone is preheated in the preheating zone. We assume that we use heat of spent gases, heat of low elevation for the preheating of the stone but that is so only in part. Only the outer periphery stone is preheated fully in the preheating zone. The stone of the inner layers continues to preheat far down the calcining section, often to almost the kiln outlet. For this, heat of high elevation, which should have been making lime, is used.

The result is a surplus of heat of low elevation, a high stack temperature, low kiln efficiency and, since potential lime making heat is improperly applied, low kiln capacity.

In Fig. 31, the origin of the heat imparted to the bed at that point for purposes of calcination and of the above mentioned delayed preheating is the 2500 deg. F. gas stream. The heat is transmitted to the outer periphery layer directly, and also through the medium of the wall. There is some surface particle replacement. In the main, however, the heat will be distributed through the bed by conduction and by convection in which the CO_2 plays an important part.

*Azbe Corp., St. Louis, Mo.

It leaves the calcining center at "A," heating up in its passage outward. If the lime at the moment is entrapped or is at the bottom of the segment of the calcining mass, the escaping CO_2 will pass through the mass as illustrated. It then becomes a medium for heat transfer, carrying its heat or heat of other possibly higher temperature adjacent pieces of lime up into the more isolated, lower temperature regions of the bed.

In this it plays an important part as a distributor of heat and possibly is why the lime kiln tends to give higher efficiency than the cement kiln. There is a greater proportionate CO_2 evolution and a more ready distribution and thus temperature equalization of the bed.

The CO_2 in its passage through the bed is cooled, then at the surface it becomes heated up again, thus robbing the surface of some transferred heat. Then it escapes and mixes into the general stream of gases which at this point is at about 2500 deg. F. In the passage of these gases toward the preheating-calcining junction, their temperature will reduce, but in an ordinary type of rotary it still will leave at 2000 deg. F.

If the lime is dolomitic there is some further use for this heat to act as a calcining medium, but if of high calcium variety the waste of sensible heat of CO_2 from 2000 deg. F. down is virtually complete, because ordinarily there is ample heat otherwise available for stone preheating. As the loss is transferred heat, it is particularly serious. It becomes somewhat less so when there is a general and substantial minimization of all of the kiln losses and through this a considerable reduction in heat available for preheating of the stone. When the stone feed is substantially dry, that is, when the kiln is not a sludge recovery rotary, the increase in efficiency would need to be considerable before such a point would be reached.

Avoidable Loss

Serious as the loss is, there is little that can be done about it because, in the main, it is unavoidable. It is important to distinguish between avoidable and unavoidable loss. Thus the products of combustion carry off heat at 2000 deg. F. but only that above 1500 deg. F. is in theory avoidable. In the case of CO_2 from the stone, if we are to make lime, it also is unavoidable and, similar to the products of combustion, only heat above 1500 deg. F. can be retained in the calcining zone.

In case of excess air this is quite different since excess air is all avoidable and therefore all heat of the entire range from 75 to 2000 deg. F. carried from the calcining zone is high level, to be counted as such and not just the 1500-2000 deg. F. portion.

Free water of the fuel is also avoidable and the loss should be evaluated similarly to the loss due to excess air, but water from available and unavailable hydrogen is not avoidable, requiring this loss to be evaluated similarly to heat loss due to CO_2 from the carbonate.

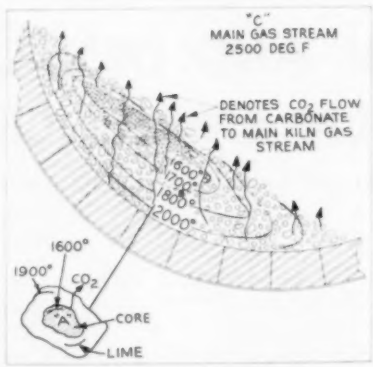


Fig. 31: Carbon dioxide flow in rotary kiln lime bed

Reduction of these losses entails quadration and will be partially due to reduction of zonal overlap, that is, creation of a sharper more positively defined temperature boundary between preheating and calcining zones, partially through reduction of bed temperature differential through freer and repeated exposure of all sizes of its components, and partially through reduction of the differential between the gases and the lime bed through increased surface and more intimate contact.

Calculation of the loss in some respects is quite involved. For example, how will we calculate the value of the heat loss at the same temperature when transferred or when untransferred? Otherwise, however, it is fairly simple and about as follows. Calculation is for the 30 percent efficient rotary kiln of the first section of this series, the kiln demanding 10,000,000 B.t.u. per ton of lime.

Calcining Zone High Level Heat Loss Due to Water

This loss has two sources, free water of the fuel which by predrying could be avoided in great part, and water having its origin in the combination of oxygen with the hydrogen of the fuel, which is unavoidable.

These losses depend partially on the amount of free water the fuel contains. This may range from 2 to 3 percent for some coals up to 50 percent for green wood fuel. Or, in the case of water from hydrogen, this may be close to nothing for coke and run up to over 2 lb. per lb. of natural gas.

The unfortunate part in this is the high latent heat of evaporation of water and the high specific heat of water vapor. At 2000 deg. F. at which the vapor is likely to pass from the calcining zone, the combined latent and sensible heat per lb. of H_2O would be 1972.3 B.t.u. and this is still to be multiplied by the 1.4 factor to give the total of high level heat loss. The amount is 2760 B.t.u. and this is twice the heat required by the calcination reaction of a lb. of CaO. In the case of free water surface moisture, the above loss applies in full. In the case of water from hydrogen, a compensation enters in that the high hydrogen fuels have a lower total weight of products of combustion, thus offsetting the higher specific heat due to their greater H_2O content.

When the water has its origin in the hydrogen content of the fuel, then similar to the case of CO_2 of the stone, nothing else can be done except through reduction of the calcining zone terminal temperature differential as much as is possible.

When the origin is free water of the fuel, then much can be done, but ordinarily the loss is figured wrong and its magnitude not properly revealed. It almost always is calculated on the basis of kiln waste gas temperature and evaluated against total heat of the fuel, rather than being based on calcining zone terminal gas temperature and evaluated and compensated for its preheating component directly in lime loss value.

With few exceptions now, the coal

Calcining Zone High Temperature Level Heat Loss Due to CO_2 from Stone

A. One lb. CaO = 0.785 lb. CO_2 gas
B. Heat capacity CO_2, B.t.u./lb. at 2000 deg. F. = 535 B.t.u./lb. CO_2
C. Heat capacity CO_2, B.t.u./lb. at 1500 deg. F. = 380 B.t.u./lb. CO_2

D. Difference = 155 B.t.u./lb. CO_2
E. CaO ratio per lb. of 13,919 B.t.u. (H) coal = 2.8
F. Total heat removed from bed by CO_2 = A x B x E = 1176 B.t.u./lb. coal
G. Total high level heat removed from bed = A x D x E = 341 B.t.u./lb. coal
H. Total low level heat loss removed from bed = A x C x E = 835 B.t.u./lb. coal
I. Total high level heat loss = G x 1.4 = 477 B.t.u./lb. coal
J. Heat value of coal (high) = 13,919 B.t.u./lb. coal

K. Avoidable heat loss due to CO_2 of stone = $\frac{477}{13{,}919} \times 100 = 3.42$ percent

L. Loss in lime production = $\frac{477}{1378 \times 2.8} \times 100 = 12.38$ percent

In the above our concern is mostly over the avoidable loss which is 3.42 percent of the total heat of the coal. But since this is high level heat, all destined for lime if it had not been wasted, the loss in production is 12.38 percent, a rather large figure.

is dried in the pulverized coal mill. For drying, the hot air from the hood is used. When coal is very wet or frozen such drying is not very positive, which results in mill performance fluctuation and as a result inferior kiln operation and efficiencies.

In any case, the heat of the air in the hood is of the high level rank and it should be used for combustion, thus augmenting the calcination effect. It should not be used for a low temperature purpose such as evaporation of water.

To use it in this manner is particularly objectionable since much of the valuable heat is lost by radiation from the bulky ordinarily uninsulated lines leading the air to the mill and then with the fuel back to the kiln. A separate air heater located close to the mill would be preferable. In this manner line radiation would be reduced and the over-all heat of the fuel used in the drying rather than the high level heat of the air from the hood. Since the gases used in drying would contain CO_2 a higher temperature could then be maintained in the mill without danger of flashes.

A better system would be to use the hot waste gases from the rear of the kiln in the mill and still better to use these gases in a separate dryer from which the spent gases and resultant water vapor would be wasted rather than returned to the kiln. In this latter case, the waste gas supply brought from the rear of the kiln would be split, part of it passing through the dryer and on to waste, and part of it passing through the mill and on to the kiln as the fuel carrier.

Through this the result would be that valuable heat would be saved and waste heat used in its place. The coal would be drier and more highly preheated and the carrier stream would have a high CO_2 rather than a high O_2 content, resulting in milder but more radiant flame characteristics, more favorable to rotary kiln operation.

The following are examples of calculations for determining heat and lime production loss due to free water and H_2O from H_2 of the fuel. The approach for the two are different. Examples are based on high rank bituminous coal of low free moisture and a rotary kiln of low thermal efficiency, using 10,000,000 B.t.u. per ton. If fuel ratio is higher, the loss of course is less. If free water is greater the loss is more. In case of H_2O from H_2, latent heat of water vapor is not considered since it is unavoidable. Only such high level heat loss from the calcining zone as is avoidable is taken into account.

The losses entailed through the use of hot air from the cooler are not taken into account, but, combined with this, the total loss may come to 10 percent of lime output even in the case of this low moisture fuel.

Loss Due to Free Water of the Fuel

A. CaO ratio per lb. of 13,919 B.t.u.(H)coal = 2.8
B. Free moisture = 3.24 percent = 0.0324 lb./lb. coal
C. Heat capacity H_2O at 2000 deg. F. = 1002 B.t.u./lb. H_2O
D. Latent heat of vaporization = 970.3 B.t.u./lb. H_2O
E. Heat loss per lb. of H_2O = 1972.3 B.t.u./lb. H_2O
F. Heat loss with free moisture = B x E = 64 B.t.u./lb. coal
G. Total high level heat loss = F x 1.4 = 89.6 B.t.u./lb. coal
H. Heat value of coal (high) = 13,919 B.t.u./lb. coal

I. Avoidable heat loss due to free moisture in coal $= \frac{89.6}{13,919} \times 100 = 0.64$ percent

J. Avoidable loss in lime production due to free moisture $= \frac{89.6}{1378 \times 2.8} \times 100 = 2.32$ percent

Calcining Zone Loss Due to Water from H_2 of Fuel

A. CaO ratio per lb. of 13,919 B.t.u.(H)coal = 2.8
B. Total hydrogen content/lb. fuel = 4.83 percent = 0.0483 lb. H_2
C. H_2O formed from H_2 in fuel = 0.4318 lb. H_2O
D. Heat capacity of H_2O at 2000 deg. F. = 1002 B.t.u./lb. H_2O
E. Heat capacity of H_2O at 1500 deg. F. = 715 B.t.u./lb. H_2O
F. Difference (D–E) = 287 B.t.u./lb. H_2O
G. High level heat loss due to hydrogen content of fuel = C x F = 124 B.t.u./lb. coal
H. Total high level heat loss due to hydrogen content of fuel = G x 1.4 = 174 B.t.u./lb. coal
I. Heat value of coal (high) = 13,919 B.t.u./lb. coal

J. Avoidable heat loss due to hydrogen content in fuel $= \frac{174}{13,919} \times 100 = 1.24$ percent

K. Avoidable loss in lime production due to hydrogen content in fuel $= \frac{174}{1378 \times 2.8} \times 100 = 4.5$ percent

If the coal had been low rank bituminous of 13 percent free water or natural gas of high hydrogen, then the high level heat loss evaluated in terms of lime production would have compared as follows:

	Loss due to Free water	Loss due to Water from H_2
High rank bituminous	2.32 percent	4.5 percent
Low rank bituminous	14.00 percent	6.0 percent
Natural gas	----	13.8 percent

Fig. 32 presents graphically the relationship of fuel ratio, calcining zone terminal temperature differential, temperature of gases leaving the calcining zone, temperature of gases leaving the kiln, as well as the heat loss from the calcining zone and its possible reduction.

The chart is based on coal and conditions as presented in the first part of this series, namely; a high rank bituminous coal, a kiln using 10,000,000 B.t.u., a lime to fuel ratio of 2.8:1, and a waste gas temperature of 1600

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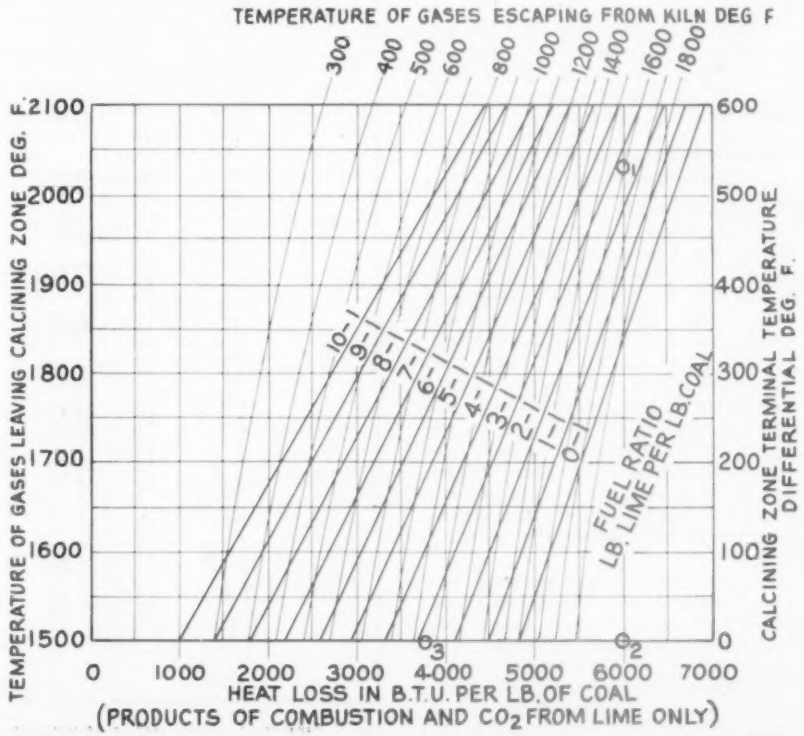


Fig. 32: Calcining zone terminal temperature differential effect on gas temperature and kiln heat loss

Porosimeter Method for Measuring Degree of Clinker Burning

By T. YOSHII and Y. MURAKAMI*

THE TECHNIQUE OF BURNING the clinker is the most important process in the manufacture of cement since the degree of burning not only influences the ultimate cement quality, but also the fuel costs, life of refractories, etc.

The degree of clinker burning has usually been judged by its appearance, by the operator feeling the material, or by measuring the liter weight (g. per liter) of the clinker. The first two methods are convenient and simple, but are arbitrary procedures at best; the liter weight method is also unreliable because its measurement differs by degree of charge into a measure and is accompanied by "human errors."

The authors have contrived a new porosimetric method for this purpose by applying a porosimeter, which E. W. Washburn and E. N. Bunting had used for measuring porosities in mortar and concrete. By this method the porosity of the clinker can be measured accurately and quickly (within 5 minutes).

To use this apparatus to aid in the control of clinker burning, it was necessary to examine the relations between the porosity of the clinker and the strength and soundness of the cement, and other factors.

Relation Between Porosity and Liter Weight of Clinker

The porosimeter used for this measurement is shown in Fig. 1. The procedure for measuring porosity is as follows: (1) sample of cooled clinker is placed in the bulb (A) so that it is almost full; (2) after opening petcocks 1 and 2, the mercury in the buret (B) is raised until the air contained in bulb A between petcocks 1 and 2 is completely expelled; (3) the buret is then moved downward until a vacuum is obtained in the bulb. The air in the clinker pores then diffuses into the vacuum space and the amount of air contained in the pores can be determined by reading the mercury column.

The relation between porosity and liter weight of normal portland cement is shown in Fig. 2. A one liter measure was used and the clinker was poured lightly into it and not packed. For convenience, the sizes of clinker sample were 5-7 cm. in diameter to compare with the liter weight of clinker determined by Anselm[1] and Mussgang.[2]

As porosity is inversely proportional to the liter weight, burning control can be done by either the liter weight or porosimetric method. The difference of porosity when the clinker size is in the range of 5-25 mm. diameter cannot be recognized.

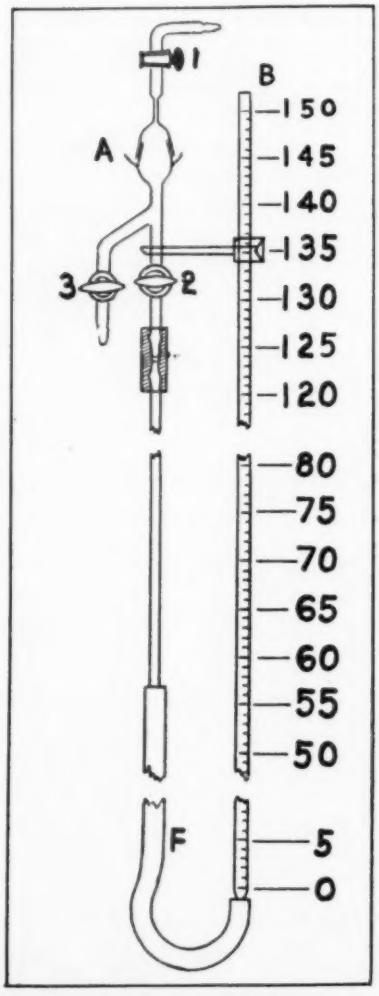


Fig. 1: Porosimeter set-up used in determining degree of clinker burning. (A) is bulb; (B) is burette

*Chichibu Cement Co., Ltd., Saitama, Japan.

Comparison with Absorbing Oil Method

Porosities of clinker were measured by two methods: terebinth oil and kerosene. The sample was 15 pieces of clinker grain, 10-15 mm. in diameter, fastened with a thread. In the one method, the sample was immersed in kerosene and boiled for 1 hr. and then weighed after cooling. In the other method, the sample was placed in a desiccator with a vacuum pump and the sample moistened with drops of kerosene and terebinth oil. The clinker sample was weighed after cooling.

Porosities of clinker samples thus measured are given in Table I; there is close agreement between the different methods.

Relation to Strength and Soundness

It is important in cement manufacture to know the extent to which the cement clinker should be burned. This is governed by chemical composition of the clinker, fineness of raw feed, conditions of fuel and combustion, and the economical grindability of clinker. Consequently, in this research, correlations of hydraulic modulus (H.M.) of clinker, from CaO in clinker, strength and soundness of cement, and the adequate degree of sintering of clinker were studied under the following conditions: fineness of raw feed, 6±2 percent/4900 mesh/sq. cm.; calorific value of coal, 7000±100 k. cal. A uniaxial, dry process kiln was used.

Since the H.M. is directly proportional to the porosity, a 0.1 rise in H.M. corresponded to a 4-5 percent rise in porosity. Fluctuation of porosity within 10 percent at a given H.M. was attributed to the manipulation of the burner.

Fig. 3b shows the relation between free CaO in the clinker and its porosity. In the underburned clinker, free CaO increased rapidly with porosity, but in a given porosity, free CaO contents fluctuated within a limit of 1.6-1.7 percent. Of course, at a given porosity, high lime clinker contained more free CaO.

Fig. 3c shows the relation of H.M. and free lime in the clinker. Free CaO contents rose with an increase of H.M., but free CaO and porosity have a logarithmic relation as shown in Fig. 3d.

The amount of the free CaO in the

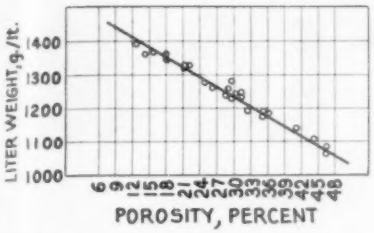


Fig. 2: Relation between porosity and liter weight of portland cement clinker by dry process

clinker was affected by both the H.M. and degree of burning. Therefore, if this relation could be determined numerically beforehand, it would be convenient in the cement manufacture. For this purpose an emperical formula was computed (Fig. 3d):

Log $F = a + b\ (50\ H + P)$

where F = percent free CaO

H = hydraulic modulus, range 1.8-2.22

P = porosity

a and b = constants;

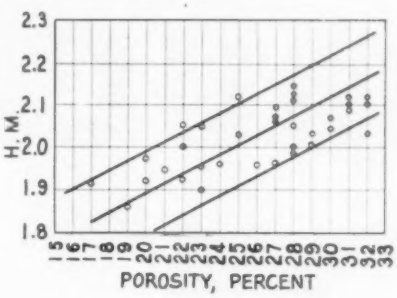
$a = -3.81$; $b = 0.031$

If free CaO in the clinker exceeds 1.5 percent, the cement yielded from this clinker becomes unsound. So to secure sound cement, (50 H + P) must always be less than 130.

For example, in the case of H.M. = 2.1, P must be less than 25 percent or H.M. = 2.2 P < 20 percent, etc.

As shown in Fig. 3a, if the H.M. of raw feed is raised, its sintering becomes difficult; so much so that it must be compensated by such considerations as facilitating fine grinding of raw feed, raising of burning temperature, adjusting the S.M. or L.M. of the raw material, or adaptation of its heating record including the cooling record of the clinker.

Relation between strength of cement and porosity of clinker, viz., degree of burning of clinker is shown in Fig. 4 under the following conditions: coal heat value, 6400±100 k. cal.; H.M. of clinker, 1.8-2.3. Compressive strength was tested according to A.S.T.M. procedures except that Japanese Soma sand was substituted for Ottawa sand. In this case, maximum compressive strength was attained at about 34 percent porosity.



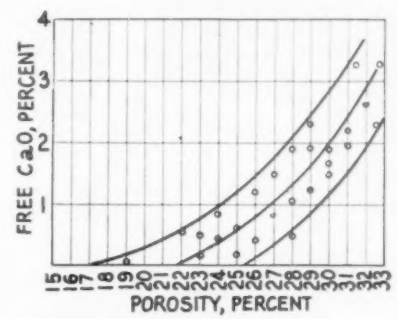


Fig. 3a (top): Relation between porosity of clinker and hydraulic modulus. Fig. 3b (bottom): Relation between porosity and free lime in clinker

So it can be concluded that excessive burning of the clinker must be avoided. Comparatively light burning is advisable within the limit of an allowable content of free CaO that is practicable.

As shown in Table II, cement clinkers in Japan are almost all overburned with more fuel consumption and producing more glass particles with less hydraulic properties. This tendency was more noticeable in the low lime clinker produced in relatively short kilns by the dry process. High lime clinkers must be sintered more than low lime types, perhaps to almost 25 percent porosity.

X-Ray and Microscope Observations

Porosity can also be determined by reflex microscope. When a polished piece of clinker was observed under a microscope, the air pores showed as dark spots and the clinker minerals as white spots. Generally crusts of clinker grains from a dry process kiln were more porous; the opposite was true for a wet process kiln.

Observation of thin sections of clinker showed the more porous clinker consisted of some minute crystals of alite, belite and a brownish ground mass. In the dense crystal, more typical crystals of alite and brownish spherical groups of belite were observed. On the surface of clinker by wet process, large crystals of belite or fibrous lameller twine were observed. In the overburned clinker, the greater part was observed to be glass and pillar-shaped, large transparent crystals of alite.

Then an X-ray picture of clinker was taken under the following conditions: target, Fe; radius of camera,

(Continued on page 92)

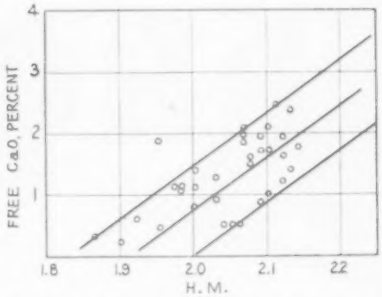


Fig. 3c: Relation between free CaO and hydraulic modulus of clinker

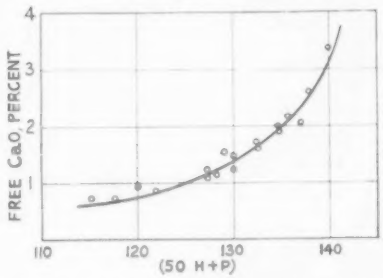


Fig. 3d: Curve for empirical formula for determining relation of free CaO, porosity, and hydraulic modulus

Table I: Clinker porosities

Sample	Process A,* with kerosene, percent	Process B,* with terebinth, percent	Process B,* with kerosene, percent	Ave., percent	By porosimeter, percent	Diff.
1	27.4	27.2	25.8	26.8	25.3	—1.5
2	26.8	26.8	27.7	27.1	25.7	—1.4
3	26.6	28.5	25.7	26.9	27.7	0.8
4	29.8	30.7	30.0	30.2	29.5	—0.7
5	30.5	29.4	31.1	30.3	29.6	—0.7
6	31.6	28.5	29.8	31.0	29.6	—0.4
7	33.4	33.0	32.6	33.0	30.6	—2.4
8	31.8	29.9	32.5	31.4	32.0	0.6
9	35.5	35.0	34.1	34.9	33.7	—1.2
10	32.0	31.9	31.8	31.9	33.8	1.9
11	36.4	35.8	36.0	36.1	35.8	—0.3
12	36.9	37.5	36.5	37.0	36.1	—0.9
Ave.	31.6	31.2	31.1	31.3	30.8	—0.5

*Process A—sample immersed in kerosene.
Process B—kerosene and terebinth poured on sample which is put in vacuum desicator.

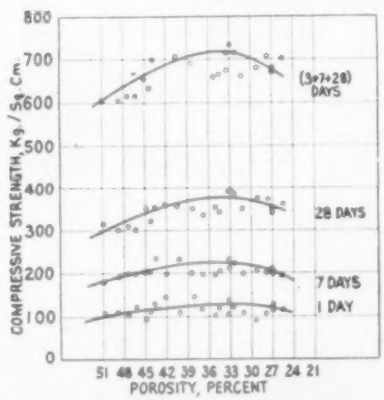


Fig. 4: Relation between porosity of clinker and strength of cement

PRODUCTION

CONTROLLED IMPACT ACTION IN WISCONSIN. Portable 3240 Impact Master with 36" x 12' apron feeder, 30" delivery conveyor, Murphy ME6 Diesel. Feeds output to 5' x 14' 3-deck vibrating screen, oversize returns to breaker. Average production 150 tph 2½" minus high quality cubical aggregate.

CONTROLLED IMPACT ACTION IN IOWA. In a free running operation this stationary closed circuit setup averages 28% of 1½" minus plus ¾", 38% of ¾" minus plus #4, and 34% aglime. Percentage of sizes can be changed easily to meet market demands. As high as 180 tph of 1½" minus have been recorded. 135 hp electric power.

CONTROLLED IMPACT ACTION IN ILLINOIS. With rotors turning at 900 rpm with GM 6031-C, this 3240 Impact Master is turning out profitable quantities of ¾" minus, and aglime. More than 50% aglime production has been noted.

CONTROLLED IMPACT ACTION IN TEXAS. A high production setup with a minimum plant investment. This portable 3240 Impact Master is equipped with 32' portable apron feeder and GM 6-110 power unit. Capacity of 200 tph of 2" minus.

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- 100% of the breaking is accomplished by rigidly mounted rotor hammers producing a better quality cubical aggregate.
- Better control over finished product size with simple mechanical adjustments changing the percentage of sizes.
- Less h.p. per ton of finished material.

Controlled Impact Action adds up to faster production, better production, more profitable production. PMCO Impact Masters are made with capacities up to 500 tph. Write for complete details.

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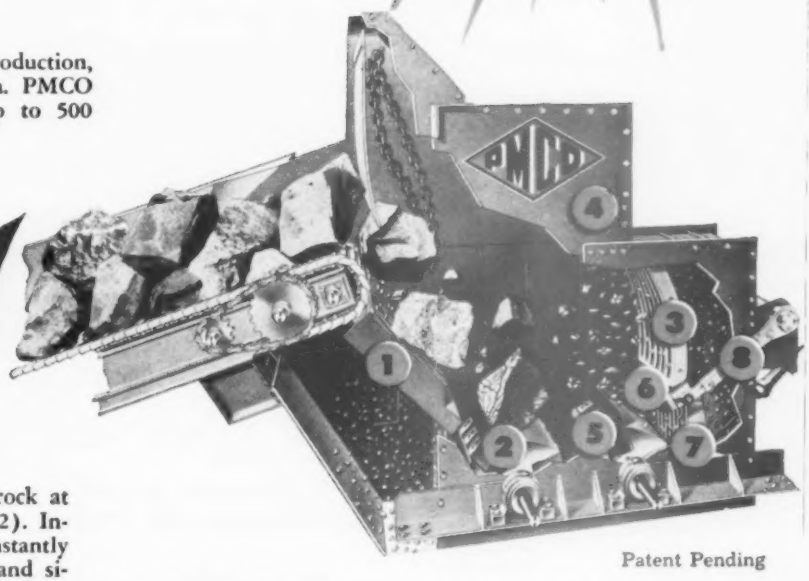

Patent Pending

Adjustable feed plate (1) guides in-coming rock at proper angle into first rotor hammer circle (2). In-fed rock is intercepted in motion, exploded instantly by the terrific impact of the rotor hammers and simultaneously projected toward vertical screen grate (3) where finished sizes are immediately discharged.

Oversize particles are deflected upwards, intercepted by feed chute back plate (4) and guided downward into the path of the second rotor hammer circle (5) where they are exploded and projected toward the bottom half of the vertical screen grate and the lower screen grate (7) for immediate discharge.

Both rotor hammers rotate in the same direction toward the rear, promoting fast feeding and keeping all material flowing toward the discharge for top capacity.

Finished product sizes are controlled by the speed of the rotor hammers, and by simple adjustments (8) of stripper bar (6) and lower screen grate.

By controlling the in-fed rock and directing its flow, practically 100% of the breaking is accomplished by the rotor hammers. There is no attrition, no abrasive or grinding action. This reduces wear and makes possible a more uniform gradation cubical aggregate.

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Table II: Porosity and H.M. of clinker in Japanese cement plants

Plant	Porosity	H.M.	Process*	Free CaO
2	17.7	2.12	D	1.11
3	28.2	2.10	D	0.48
4	15.8	2.05	D	0.24
5	23.0	2.09	D	1.38
6	16.7	2.14	D	1.38
7	23.6	2.13	D	1.00
9	17.6	2.14	D	2.08
13	14.5	2.15	D	1.19
14	13.0	2.13	D	0.78
15	23.8	2.15	D	0.73
17	22.3	2.16	D	0.51
18	27.3	2.02	D	1.39
20	23.6	2.21	D	0.88
21	25.1	2.13	D	0.48
22	26.0	2.08	D	0.84
23	25.0	2.12	D	1.87
24	34.8	2.19	D	1.40
27	11.4	2.00	D	1.22
28	22.8	2.10	D	0.13
30	26.5	2.05	D	0.33
31	21.3	2.08	D	0.39
32	23.7	2.15	D	1.91
33	26.2	2.03	D	1.25
34	23.5	2.05	D	1.12
Ave.	All kilns—21.3 Long Kiln (>60m.)—24.1 Short kiln (<60m.)—19.3	2.11	D	1.01
1	23.4	2.05	W	0.70
8	29.5	2.06	W	0.78
11	16.9	2.16	W	1.21
12	17.8	2.14	W	0.65
16	23.6	2.10	W	1.69
19	22.2	2.17	W	2.05
29	28.4	2.03	W	0.40
Ave.	23.1	2.11	W	1.18
10	17.9	2.07	L	0.17
26	20.6	1.86	L	0.87
Ave.	19.3	1.97	L	0.54
Total Ave.	21.6	2.10		1.01

*D—dry process; W—wet process; L—Lepol kiln.

Table III: Kiln characteristics

Kiln	Ave. porosity, percent	Rate of fluctuation, percent	Porosity, percent	
			Max.	Min.
A	36.1	29.2	52.6	21.1
B	29.5	29.1	47.4	10.9
C	33.7	35.7	52.3	11.9
Ave.	33.9	34.8	50.7	14.5

Table IV: Burner characteristics

Burner	Ave. porosity, percent	Fluctuation, percent	No. of working shifts observed
X1	34.2	30	10
X2	32.0	34	11
X3	31.8	41	12
X4	33.8	34	4
X5	33.2	32	4
Ave.	33.0	37	—
Y1	31.2	33	8
Y2	33.0	33	8
Y3	32.3	41	6
Y4	36.8	40	7
Y5	32.3	42	8
Y6	36.2	37	5
Ave.	33.7	38	—
Z1	34.8	26	10
Z2	37.4	39	10
Z3	33.2	24	11
Z4	38.6	26	6
Ave.	35.3	29	—

30±0.02 mm.; electric power and exposure, 6 ma., 50 kv.-a., 17 hr. Since the picture was almost completely covered with alite lines, it was not possible to check the degree of burning with the X-ray technique.

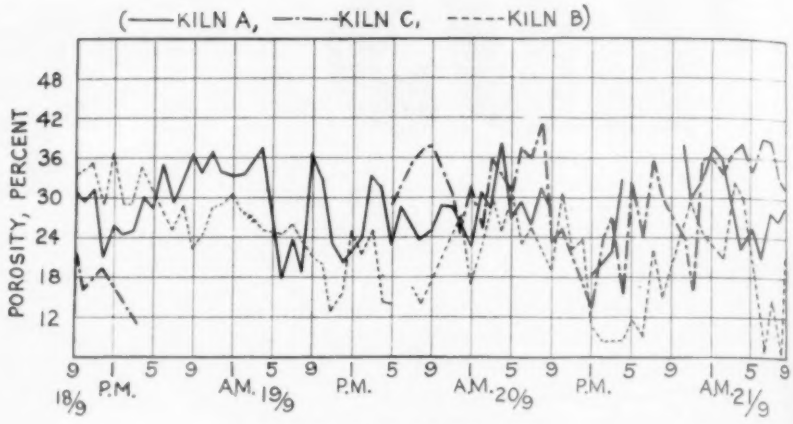

Fig. 5: Porosity chart for rotary kiln

Characteristics of Kiln Burners

Porosities of clinker obtained from kilns A, B and C by dry process are shown in Fig. 5. Since the degree of sintering fluctuated frequently, it is evident that it is difficult to control the degree of sintering by measuring the liter weight of the clinker only two or three times a day.

Tables III and IV show the characteristics of each kiln, each burner and each working shift group. By checking the causes of fluctuation of porosity systematically, defects of working conditions and kiln control have been improved considerably.

References

[1]Anselm, W.; *Zement*, 1936, (25), S633; 1937 (26) S502, 515.
[2]Mussgang, G.; *Zement*, 1937, (26) S1, 22, 671.

Abandoned Quarry Converted Into Park

A recent article, "What Was Once an Old Quarry," in the *Voice of the Cement, Lime, Gypsum and Allied Workers* reviews the development by the people of East Fultonham, Ohio, of an abandoned quarry into one of the finest recreation parks in the state of Ohio.

In 1939, when the Columbia Cement Division of Pittsburgh Plate Glass Co., located at East Fultonham, Ohio, abandoned its Buckeye Creek limestone quarry operations for a new location, the quarry filled with water, forming a lake of over 40 acres. A group of interested people from the community met with officials of the Columbia Cement Division and formed a nonprofit corporation called the Columbia Recreation Association.

About 85 acres, including the lake, were leased from the company. Employes of Columbia Cement Division and interested members of the community were issued shares of stock and each shareholder and his family were entitled to all the privileges of the association. Memberships were also issued at $5 per year. Trustees are elected every three years and officers every year. A lake superintendent and committees are also appointed each year. The park was dedicated and named Lake Isabella in 1940.

The banks of the quarry were landscaped and white sand for the beach was furnished by Central Silica Co. Four life guards are on duty every day and five on Sundays and holidays during the summer. Other facilities include all necessary safety equipment; a modern concrete-block bathhouse; refreshment stand; shelter house where dances are held every two weeks; roads, bridges and paths; picnic facilities; a 5-room house for the caretaker who lives there the year around; and the lake has been stocked with various fish.

The whole community was back of the project and much of the work was done with voluntary labor. Construction companies loaned the use of heavy machinery and other companies contributed many supplies.

Although the main season is from June to September, skating and sledding are enjoyed in the winter. This year the association has over 1500 members, but the park also attracts guests from all over Ohio and from many other states. The association is completely self-supporting and all money taken in is used for improvements and upkeep.

Calaveras Expansion

CALAVERAS CEMENT CO., San Francisco, Calif., recently announced that its $2,235,000 expansion program at its San Andreas, Calif., plant is progressing according to plan, and that footings for a new fourth kiln are almost completely installed. The first of three new grinding mills, a 9- x 9-ft. Marcy preliminator, has also arrived at the plant. The expansion program will increase the company's production of regular and specialty cements by 50 percent beginning in the spring of 1952.

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CEMENT, STEEL AND CAR SHORTAGES WORRY CONCRETE MATERIALS INDUSTRY

Directors of National Sand and Gravel and National Ready Mixed Concrete Associations compare experiences at White Sulphur Springs

THE SEMI-ANNUAL MEETINGS of the boards of directors of the National Sand and Gravel Association and the National Ready Mixed Concrete Association, at the Greenbrier, White Sulphur Springs, W. Va., Oct. 1-3 inclusive, began with a note of sadness, because of the sudden death of one of the most beloved former members of the board, H. P. Caldwell of Louisville, Ky. Mr. Caldwell died in his hotel room on September 30, the night before the meeting of the board. Mrs. Caldwell and he had been around all day renewing old friendships among the early arrivals. When the board met the next day not only was it necessary to announce the sad news of "Ham" Caldwell's death, but the death in Salt Lake City about the same time of Eric W. Ryberg, recently elected an honorary director and for a long time a director and active in both the sand and gravel and ready-mixed concrete industries.

Also, the recent death of one of the early presidents of the association, Hugh Haddow, Jr., of Millville, N. J., was reported. Another death among the past-presidents, R. C. Fletcher, Des Moines, Iowa, had been announced sometime previously. Appropriate tribute was paid these former associates by the directors, both personally and on behalf of the association.

Sand and Gravel Board

Harris N. Snyder, Buffalo, N. Y., president and chairman of the board of the directors of the National Sand and Gravel Association opened the meeting with a few brief comments on the loss to the association of H. P. Caldwell and Eric Ryberg.

The association, he said, is prospering and the outlook is bright notwithstanding the difficulties introduced by war and government regulations. Up to this time anyhow, construction of the kind requiring aggregates and concrete is proceeding. The financial report showed that the association is in sound and prosperous condition. The membership is constantly increasing through the good work of the board members, each and everyone of whom is ex-officio a member of the membership committee.

During the past several months regional meetings attended by either or both the executive secretary and the director of engineering have been held so as to pretty well cover the entire country. Various members of the board endorsed these regional meetings highly. They bring to many, both members and nonmembers, much helpful information for operating their businesses successfully.

Other association activities discussed in some detail included a method to be adopted for processing applications for membership, the work accomplished by the committee on taxation and the status of the work done by the O.P.S. Advisory Committee for the Sand and Gravel Industry. J. Rutledge Hill, Dallas, Texas, reported at some length his experiences in convincing the committees of the Congress that a percentage depletion allowance was necessary to the industry if it is to continue to maintain adequate sources of supply near the centers of population in the years to come. It was by no means an easy task to convince Congressmen, who in their travels about the country see plenty of sand and gravel from car windows, that deposits which are not economically accessible are practically valueless, and even accessible deposits are of little value unless they can be screened to specified sizes. The board of directors passed resolutions commending Mr. Hill's committee work and also the work of the O.P.S. committee, which is a committee of the industry appointed by the O.P.S. and not an association committee.

The chief subject for discussion under engineering and research activities had to do with lengthening the term of the contract between the association and the University of Maryland, where the research work is done. There were no new problems in regard to sand and gravel aggregate to discuss, but Stanton Walker, director of engineering, gave the impression that some of the criticisms of aggregates by the Corps of Engineers, U. S. Army, and others, in regard to so-called thermal incompatibility and related problems were in a fair way to be answered effectively. The popularity of the association's short course in concrete techniques at the University of Maryland each fall is making the handling of the school a major problem, Mr. Walker said.

Most of the rest of the discussion was led by V. P. Ahearn, executive secretary, who reported on railroad car supply, the industry safety program, the problem of stream pollution, zoning and land rehabilitation, the new freight rate structure, the industry problems created by M.R.O. (capital additions to plants, minor and major) and other matters of general interest.

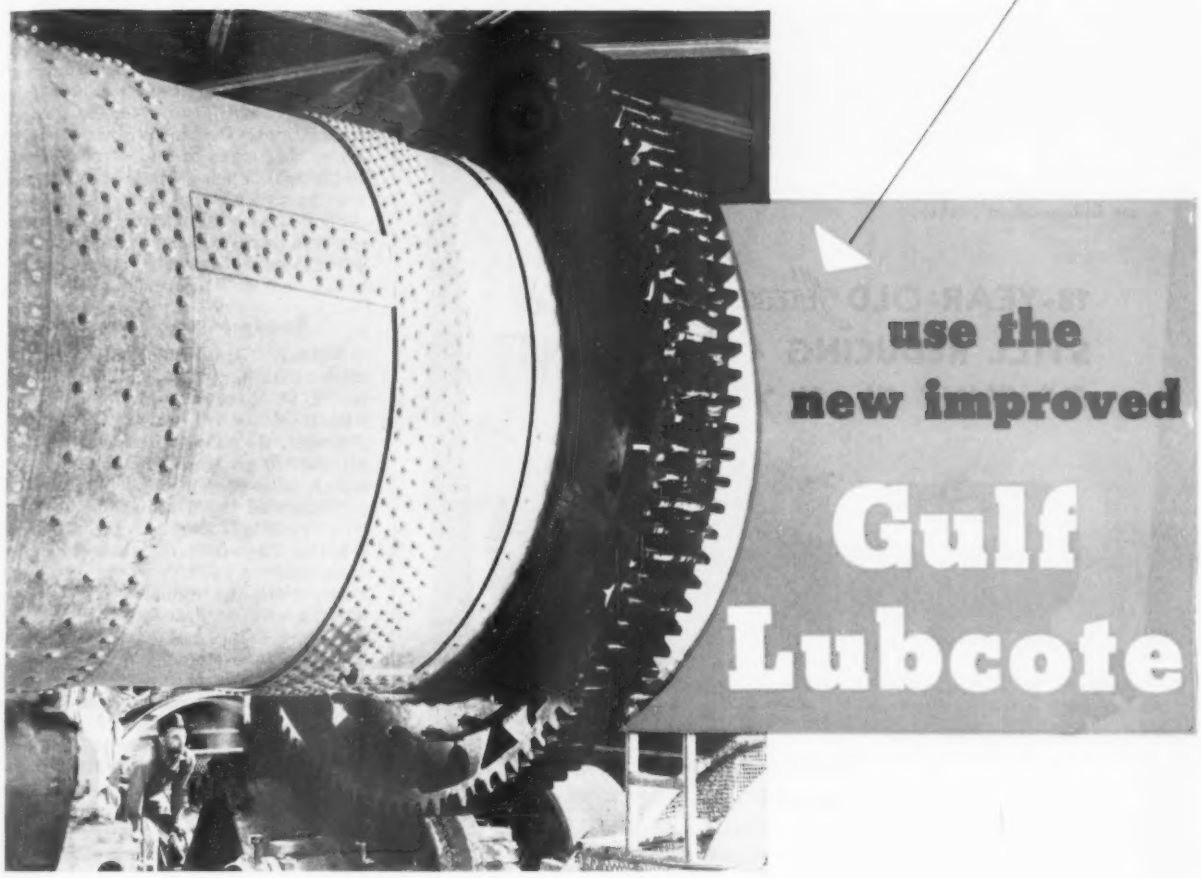
As has been true for a long time the railroad car supply in many sections of the country is inadequate and the cars are often in need of considerable repair before they can be loaded. The immediate outlook for improvement, apparently, is not very encouraging. In regard to the changes (increases) in the freight rate structure it would appear that little can be done on a national scale through the I.C.C., but various members brought out the possibility of convincing railway traffic officers that rates must be competitive with truck hauling costs, or the railways would lose more and more business.

In regard to the effect of M.R.O., Mr. Ahearn thought the industry was getting along as well as could be ex-

(Continued on page 96)

Activities of the association as well as general industry problems received attention at the Board of Directors meeting of the National Sand and Gravel Association, White Sulphur Springs, W. Va.

now - for lower cost maintenance of open gears and wire rope



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pected. It is extremely difficult to get authorizations for major equipment. Shortages of cement are perhaps holding up as much construction as shortages of steel and plant equipment made of steel, judging by the round-table discussion.

A report on the 1952 convention plans and the reports of the directors representing the manufacturers' division are covered later on in this article, since the major discussion was on October 3, at the meeting of the combined board of directors of the two associations. Wayne W. King, Baltimore, Md., made a kind of valedictory address, this being his third and final year as a member of the board. It was evident that he deserved the applause received because he has been a very industrious and helpful member of the board.

Ready-Mixed Concrete

Norman J. Fredericks, Detroit, Mich., president and chairman of the board of directors of the National Ready Mixed Concrete Association presided. He noted with pleasure that all but about three members of the board were present. The financial report showed the association in excellent condition, as have the previous reports. The active membership in the association appears to be growing faster than the industry itself. During the year to date there have been 52 new members and six new associate members (equipment manufacturers).

The matter of processing new applications for membership came up for discussion, as it had at the meeting of the board of the National Sand and Gravel Association. Since the problem was identical in both associations it was decided to have a small joint committee study the matter and be ready to report at the time of the next annual convention.

The report of the committee on group insurance was quite complete and exhaustive in spite of the difficulties brought about by different state laws. The plan suggested, to be administered through the national association, but financed by the insurance carrier or carriers would provide a $1000 life insurance for workmen, $2500 for executives, with the same benefit for accidental death or dismemberment either on or off the job. Sickness and disability payments would be $20 per week. Hospitalization insurance payment is more complicated—perhaps about $9 per day for employes and $7 for dependents. The whole program was estimated to be a "fringe wage benefit" amounting to a payroll cost of about 2½c per hr.

The O.P.S. Advisory Committee for the Ready Mixed Concrete Industry was reported to have held a meeting in Washington, D. C., in August at which every member was present. The industry is now allowed to increase prices enough to take care of increased freight rates on materials and to provide for increased cost of out-of-area cement, which has been de-

fined as cement purchased outside the zone of normal supply. The method of proportioning the extra cost of this cement appeared to be rather complicated and came in for considerable discussion.

The report on the engineering activities of the association by Stanton Walker, director of engineering, was concerned chiefly with limitations on mixer-truck axle loads and the efficiency of truck mixers. It was suggested that the Truck Mixer Manufacturers' Bureau, which is affiliated with the association, conduct tests to supply missing data.

The representatives of the Truck Mixer Manufacturers' Bureau said that every attention was being given to the problem of pay loads and axle loads. The representative of the bureau on the association's board, has recommended to the bureau (1) closer cooperation with the association; (2) development of technical information in regard to truck mixers and their use; (3) cooperation in writing specifications; (4) an advertising campaign to popularize the bureau's rated capacity plates on trucks. The opinion was expressed that in spite of M.R.O. ratings the truck-mixer industry would be able to meet most of the demands of producers in 1952. V. P. Ahearn, executive secretary, was not nearly as optimistic on that score.

Other matters resulting from the war conditions in Washington, D. C., were discussed by Secretary Ahearn. He said it would be a tax on the ingenuity of plant operators to keep the plants running, but that the industry should have no hesitation in asking for its needs, since so much of present construction is involved in the defense effort.

The cement shortage situation was discussed in some detail. It is not as universal a problem as it has been, for some sections are getting ample supplies. The general opinion seemed to be that little more could be done for the ready-mixed concrete industry at this time. Ohio appeared to be suffering the most severe shortage and no new plants or production is in sight there, and the projected cross-state turnpike is expected to require nine or ten million barrels.

Discussion of details of the convention program are combined with the report of the joint meeting of the two boards in what follows.

Joint Meeting of Boards

The first subject discussed by the joint meeting of the two boards of directors was the coming 1952 convention at the Stevens Hotel, Chicago. Combining some of the discussion at the two previous board sessions, it appears that the industries are facing a rather critical decision. The sand, gravel and ready-mixed concrete industries have outgrown the type of hotel exhibits they have always had, and the question is raised as to whether or not the time has come to abandon these in favor of an outside audi-

Vincent P. Ahearn, executive secretary, reports on matters of general interest to the N.S.G.A. Board of Directors at the meeting at White Sulphur Springs

torium show, such as the American Road Builders' Association and the National Concrete Masonry Association hold. The exhibitors, the members of the manufacturers' division of the associations, apparently are in favor of the outside type of exhibits, combined if possible with the N.C.M.A. and/or the National Crushed Stone Association exhibit.

The rub comes in the fact that few cities have both the adequate hotel accommodations and an exhibit hall, near at hand, to hold such conventions simultaneously. Moreover, there is strong sentiment in the National Crushed Stone Association to stick to the hotel type of show, and a great reluctance to combine the show with that of the National Sand and Gravel and National Ready Mixed Concrete Associations by having the conventions in the same city in the same week. The outcome, at this stage, looks like a separation of the two conventions, which for the last several years have been holding their even-year conventions in the same hotel on succeeding weeks, thus permitting the exhibitors in both shows to concentrate their efforts. The date of the conventions in 1952 is the week of February 11.

Details of the program were discussed on the basis of a questionnaire to the directors following the convention at New Orleans last February. The concensus of the opinions and suggestions was that the convention programs should keep about the same character as they have for the past several years. That is, the subjects discussed and the speakers should be confined as much as possible to the intimate problems of the industry. There is little or no sentiment in favor of the type of spell-binder so common nowadays at all kinds of group meetings. There will be better facilities for renewing friendships and acquaintances without the free bar which proved so expensive at the last Chicago convention. Apparently a lot of people not in any way connected with the industries participated at the expense of the associations.

While everyone seemed to be in favor of keeping the meetings as informal as possible some of the sessions, particularly the one on merchandising, have become so popular that the committee in charge of this feature believes it should be more organized with a few prepared discussions. These particular discussions have been found to be highly commended by the industry at large.

The activities for joint research and engineering work by the two associations were discussed in some detail by Stanton Walker. The matters of most current interest appear to be investigation of fly ash in concrete, and admixtures in general. Mr. Walker cautioned users of fly ash that there are various kinds with correspondingly different results. An outline of the forthcoming (November 12-16 incl.) short course on aggregates and concrete was presented for discussion. There will be three groups of students divided into classes on various phases of laboratory testing and concrete-mix design.

J. Rutledge Hill, Gifford-Hill & Co., Dallas, Texas, considers a weighty problem at the N.S.G.A. Board of Directors meeting

Perhaps the most pressing technical problem before the industry, Mr. Walker said, is the evaluation of aggregates from different sources with particular reference to the durability of concrete made with them. There are many factors involved besides the mineral character of the aggregate such as aggregate proportions and grading, the methods of making such laboratory tests as freezing and thawing, the kind of molds used to make the specimens, etc.

Aggregates for bituminous mixtures often present a stripping problem, due to the greater affinity of siliceous minerals for water than for asphalt. This can be overcome, Mr. Walker said, by the use of anti-stripping agents, of which the simplest one is soaking the pre-dryed aggregate in lime water. In the case of chert gravel, at least, this treatment has helped a great deal.

Mr. Walker said that in making interpretations of the results of the Maryland test pavements, which were beaten to pieces by overloaded trucks, producers should not overlook the impetus it has given other highway departments to experiment with asphaltic-type surfaces designed to carry loads equal to any concrete pavement. The Asphalt Institute is using the occasion to actively promote its product. Mr. Walker expressed the opinion that future pavements will be designed for 40,000-lb. axle loads, as is the New Jersey turnpike now under construction.

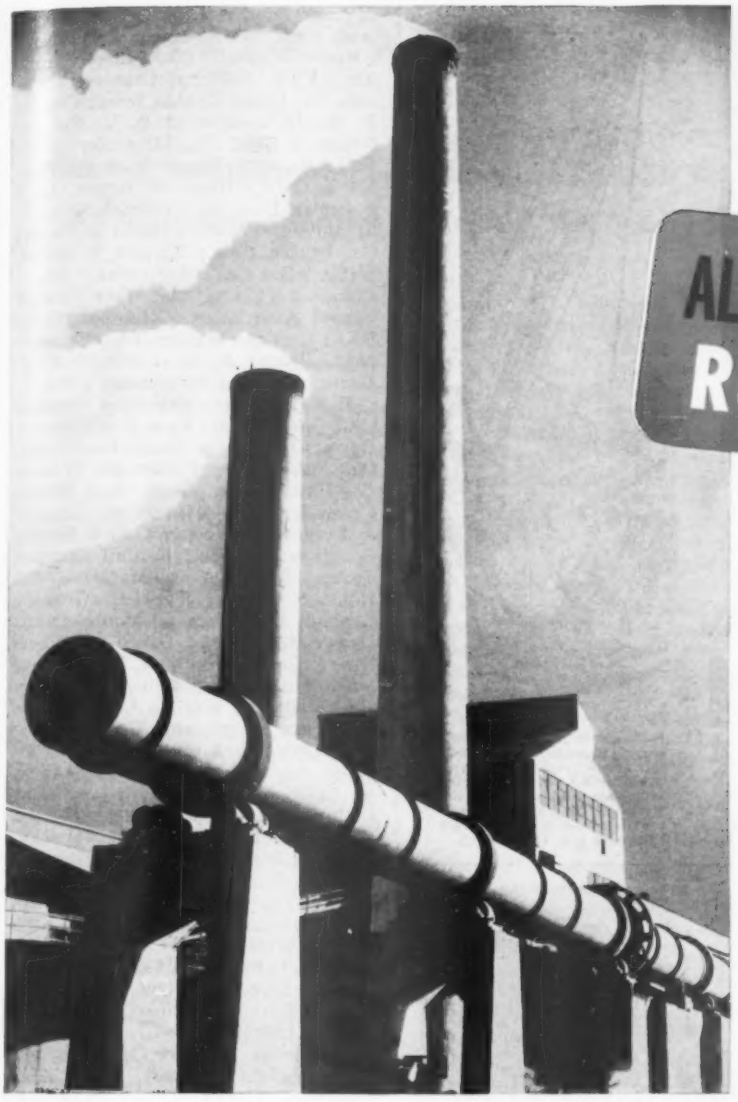
The joint sessions of the two boards was concluded by a comprehensive review of national problems of these and all other industry, by V. P. Ahearn, executive secretary. He said the pricing situation in the industry is confused and likely to remain so. He said there is a movement in existence to bring private motor truck carriers under control as are the contract carriers. He took a rather pessimistic view of any relief from the various annoying Federal regulations in the near future. He thought these regulations and controls would be with us for a long time.

The only new business acted upon was a slight change in the constitution and bylaws to provide for two vice-presidents of the associations instead of one, and to make the offices of treasurer and secretary separate. The place of the next fall meeting of the two boards will be at the Ocean House, Swampscott, Mass. This is the first time the boards have gone to New England for their fall meeting, and the setting will be a typical seashore resort, a favorite with New Englanders since Colonial days.

Following is the list of the directors and guests attending the White Sulphur meetings:

R. H. Baker, Dixie Sand & Gravel Corp., Chattanooga, Tenn.; R. S. Bar-

(Continued on page 100)



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Cement plant operators in the United States and throughout the world have found Allis-Chalmers rotary kilns a *profitable* investment . . . in terms of low production costs, long, dependable service life and low maintenance. Here are some of the reasons why:

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- Allis-Chalmers has led the way in the development of rotary kilns to their present high production efficiency... has engineered such major improvements as centralized kiln control, the heat recuperating chain system, air-cooled feed and discharge ends, improved kiln feeders.
- Allis-Chalmers has had over a half century of experience in engineering and building equipment for *hundreds* of cement plants. A-C can cooperate in the design of a complete plant from the ground up—and furnish all equipment too. When you specify Allis-Chalmers you get *undivided responsibility* for *all* equipment!

The Allis-Chalmers representative in your area can give you the complete facts about Allis-Chalmers kilns. Call him or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 07B6368A.

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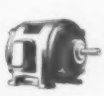
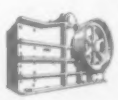

Motors


Controls


Grinding Mills


Vibrating Screens


Gyratory Crushers


Jaw Crushers

neyback, Henry J. Kaiser Co., Oakland, Calif.; C. A. Barinowski, Montgomery Gravel Co., Birmingham, Ala.; F. E. Bellamy, Concrete Materials Co., Cedar Rapids, Iowa; Charles E. Brady, Lessees of B. V. Hedrick Gravel & Sand Co., Lilesville, N. C.; E. F. Brovelli, Basalt Rock Co., Inc., Napa, Calif.; Henry J. Brown, Cook & Brown Lime Co., Oshkosh, Wis.; J. A. Bullen, Fountain Sand & Gravel Co., Pueblo, Colo.; Morgan R. Butler, Butler Bin Co., Waukesha, Wis.; Claude L. Clark, The Ohio Sand & Gravel Association, Columbus, Ohio; R. C. Collins, Warner Co., Philadelphia, Penn.; E. K. Davison, J. K. Davison & Bro., Pittsburgh, Penn.

J. B. Donovan, Valentine Concrete Co., Springfield, Mass.; William J. Doyle, Jr., Tulsa Sand Co., Tulsa, Okla.; Alexander Foster, Jr., Warner Co., Philadelphia, Penn.; A. J. Frank, Chain Belt Co., Milwaukee, Wis.; N. J. Fredericks, Koenig Coal & Supply Co., Detroit, Mich.; E. Phil Gemmer, Texas Construction Material Co., Houston, Texas; Paul C. Graham, Graham Bros., Inc., El Monte, Calif.; Heyward Green, Green Brothers Gravel Co., Franklinton, La.; J. Rutledge Hill, Gifford-Hill & Co., Inc., Dallas, Texas; William Edward Hole, American Aggregates Corp., Greenville, Ohio; R. K. Humphries, Pacific Coast Aggregates, Inc., San Francisco, Calif.

Herbert Jahncke, Jahncke Service, Inc., New Orleans, La.; Ralph C. Johnson, Simplicity Engineering Co., Durand, Mich.; Howard W. Jordan, Metropolitan Sand & Gravel Co., Port Washington, N. Y.; Walter M. Keeler, The Walt Keeler Co., Inc.; Wichita, Kan.; Frank L. Kelly, Colonial Sand & Stone Co., New York, N. Y.; M. G. Kerr, American Aggregates Corp., Detroit, Mich.; Wayne W. King, The W. S. Tyler Co., Cleveland, Ohio; Harold M. Lacy, Dallas Concrete Co., Dallas, Texas; Elbert F. Lewis, F. D. Lewis & Son, Inc., Greensboro, N. C.; James F. McCracken, American Builders Supply Co., Louisville, Ky.; Robert Mitchell, Consolidated Rock Products Co., Los Angeles, Calif.; William Moore, J. P. O'Connell Co., Boston, Mass.; R. P. Mumford, The Beckley & Myers Co., Springfield. Ohio.

John W. Murphy, Union Sand & Gravel Co., Spokane, Wash.; Richard Nugent, Nugent Sand Co., Louisville, Ky.; T. E. Popplewell, Ft. Worth Sand & Gravel Co., Ft. Worth, Texas; Robert F. Porter, Harry T. Campbell Sons' Corp., Towson, Md.; J. P. Eyre Price, Wyoming Sand & Stone Co., Scranton, Penn.; John Prince, Stewart Sand & Material Co., Kansas City, Mo.; John W. Roberts, Southern Materials Co., Inc., Richmond, Va.; Nathan C. Rockwood, ROCK PRODUCTS, Chicago, Ill.; Floyd G. Rubey, Dubuque Ready Mix Concrete Co., Dubuque, Iowa; Richard Seaman, Chain Belt Co., Milwaukee, Wis.; Louis C. Schilling, I. E. Schilling Co., Miami.

(Continued on page 102

SAFETY EXPERTS EXCHANGE IDEAS

Blasting safety, controlling plant hazards, off-the-job safety promotion and safety training receive attention at Cement and Quarry Section of National Safety Congress

THE 39TH NATIONAL Safety Congress and Exposition again brought safety engineers and company representatives converging on Chicago during the week of October 8-12 for a week of demonstrations, lectures, new developments and discussion of ideas for promoting safety. The Cement and Quarry Section again was well represented, and during its two days of meetings heard talks on making blasting methods safer, controlling plant hazards, promoting safety both on and off the job, and safety training for small organizations.

General chairman Lea P. Warner, Jr., Warner Co., Philadelphia, Penn., opened the section meeting in the Stevens hotel, October 10, with the presentation of the annual report. The executive committee of the Cement and Quarry Section, he reported, had previously discussed enlivening the visual aids and information program. Work is in progress on a film "Heavy-Duty Truck Maintenance." Mr. Warner also requested that more contributions be sent to the section *News Letter*. That publication needs the help of all individuals.

Blasting Safety

F. D. Bickel, explosives department, E. I. du Pont de Nemours & Co., Wilmington, Del., presented a talk on new developments in the safe handling of explosives. Make-up of the explosive itself has reduced danger, Mr. Bickel reported; ammonia and ammonia-gelatine types are safest and have replaced nitroglycerine types (dynamite) in quarries to a large extent. The latter may be detonated by fire, friction or rifle bullet. Most accidents involving any explosive are those that have recurred many times in the past, and easy methods have been found to prevent them, according to the speaker.

As an illustration of data prepared to prevent the recurrence of accidental detonation of explosives, Mr. Bickel presented an abstract of a research report on propagation distances for different explosive charges. Dynamite and ammonia explosives were compared on charts, showing the distance from various sizes of charges at which detonation would occur and at which there would be complete failure. Also shown on large charts were drawings of various plans for spacing dynamite charges to insure propagation to adjacent holes.

Many accidents are caused by the failure to cut a spool and move it away from a hole, Mr. Bickel said. Whenever an accident does occur, state officials and the public clamor for more regulation. Legislation on explosives regulation is pending in many states, according to the speaker. Too many complacent operators help bring this nearer, he claimed. Mr. Bickel then discussed electric delay blasting caps. Though these are relatively safe, many instances of premature explosions during lightning storms, snowstorms, near radio stations, or by static in dry climates, have led to the development of a 17 millisecond delay blasting fuse called Primacord MS. He presented methods of determining field strength near a radio station, a factor that will indicate the danger involved with electric caps. Mr. Bickel also discussed the Du Pont portable blasting switch by which 1000 caps in series-parallel (or 40 caps in straight parallel) may be fired.

Eliminating Plant Hazards

Two speakers were on hand to discuss ways of controlling severe plant hazards. O. A. Lawrence, plant manager, Universal Atlas Cement Co., Buffington, Ind., and Howard Riefenstahl, safety director, Alpha Portland Cement Co., Easton, Penn., both agreed that constant attention to housekeeping is necessary to eliminate accidents.

Mr. Lawrence stressed principally the need for guarding moving machinery, since most equipment used in the rock products industry is heavy and dangerous. Equipment must be shut down during adjustments and repairs, in addition to providing machinery guards. Mr. Lawrence described his plant's locking-out method during machinery repairs. This program was begun when a serious accident almost occurred when a supposedly locked-out switch was thrown, endangering a workman near the machine. Investigation revealed that duplicate keys had been issued for the safety lock, and that different departments administered the locking-out program differently.

A committee decided that a safety lock is a personal tool to protect the individual. The committee recommended that each worker be issued a "personal safety lock" which he should take with him. The only duplicate key is kept in a locked cabinet in the supervisor's office. In the event a workman quits work before the job is finished, he obtains another lock, a "machinery lock," from the department to protect the machine.

Every safety lock is color coded by

(Continued on page 106)

Executive committee members and members-at-large of the Cement and Quarry Section included those shown here. Front row, left to right, are P. N. Bushnell, Universal Atlas Cement Co., New York, N. Y.; Ivan Legore, Portland Cement Association, Chicago, Ill.; Harvey F. Yotter, The General Crushed Stone Co., Easton, Penn.; and T. W. Jones, New Haven Trap Rock Co., New Haven, Conn. In the back row (l. to r.) are Howard Riefenstahl, Alpha Portland Cement Co., Easton, Penn., a featured speaker on the program; Seymour Fleming, New York Trap Rock Corp., Newburgh, N. Y.; C. A. Gustafson, The Callanan Road Improvement Co., South Bethlehem, N. Y.; Lea P. Warner, Jr., Warner Co., Philadelphia, Penn.; and L. D. Cowling, Louisville Cement Corp., Speed, Ind.

Directors Meet

(Continued from page 100)

Fla.; Albert R. Shiely, J. L. Shiely Co., St. Paul, Minn.

C. W. Shirey, C. W. Shirey Co., Waterloo, Iowa; Alfred H. Smith, A. H. Smith, Branchville, Md.; Harris N. Snyder, Buffalo Slag Co., Buffalo, N. Y.; Stephen Stepanian, The Arrow Sand & Gravel Co., Columbus, Ohio; M. Eugene Sundt, Albuquerque Gravel Products Co., Albuquerque, N. M.; H. F. Thomson, Material Service Corp., Chicago, Ill.; Walter E. Trauffer, *Pit and Quarry*, Chicago, Ill.; R. E. Weaver, Lincoln Sand & Gravel Co., Lincoln, Ill.; Vincent P. Ahearn, National Associations, Washington, D. C.; Stanton Walker, National Associations, Washington, D. C.

Labor Relations Trends

(Continued from page 49)

four employes who were paid salaries in excess of $200 per month as administrative employes. The hearing examiner ruled: "That such employes be paid on a salary basis at a rate of not less than $200 per month is only one of the qualifications of noncovered administrative employes. The employes in question clearly were not administrative employes and they met none of the other prescribed qualifications."

The only time-keeping records available for the hearing were transcripts made by the Labor Department investigator many months before. The original memoranda were not available. These records showed that the employes worked normally and regularly a 10-hr. day, and sometimes more and sometimes less. The employes who testified claimed they worked 10½-hr. days. Consequently, the examiner added ½ hr. to all the 10-hr. days as shown in the record. On this basis it was decided the producer owed the federal government $1,032.11 as liquidated damages.

Safety and Sanitation

The following conclusion should be of interest to all producers who furnish materials under direct government orders, even if they are complying with the wage and hour provisions of the Walsh-Healey Public Contracts Act:

"In support of that portion of the complaint alleging that the respondent, in the period ending May 21, 1948, caused and permitted employes engaged in the performance of the contract to work in surrounding and under conditions which were unsanitary, hazardous and dangerous to the health and safety of the employes, counsel for the government offered in evidence the report of the department's investigator specifying the conditions which he observed in the course of his investigation of respondent's operations. His findings, which he affirmed on the witness stand to be true and to

which the respondent offered no objection, were reported as follows:

"'The firm does not provide: Toilet facilities of any type, washroom facilities of any type, first-aid facilities of any type, a supply of drinking water for employes, injury frequency rates, fire-extinguishing equipment of any type, adequate guard rails for walkways, pit, openings at the crusher. The firm does not provide respirators for men working around crushing and screening operations, where the air is contaminated with limestone dust. The firm does not dampen down or remove dust by means of a vacuum pick up. This situation is technical and requires corrective action by the safety engineers.'"

"The evidence that the foregoing conditions existed is not controverted. The failure to supply drinking water and to provide toilet, washrooms, first-aid and fire-extinguishing facilities and equipment of any kind contravenes fundamental health and safety standards. On the other hand, the recital in the report that adequate guard rails and respirators were not provided, and that limestone dust was not dampened down or removed, is not sufficient, standing alone, to decide the technical question of whether or not the conditions referred to were in fact hazardous and dangerous."

Missouri Crushed-Stone Producer Exempt

The U.S. Department of Labor has lost a significant case in the U. S. District Court, Western District of Missouri. The case is Tobin (Secretary of Labor) v. Johnson et al (crushed-stone producer). Part of the Court's decision, Judge Duncan, was as follows:

"The essential facts are not in dispute. The defendants own and operate rock quarries at Carrollton and several other places in the State of Missouri, and produce quarry run rock, ballast, crushed stone and asphalt mix.

"The defendants admittedly did not pay their employes in accordance with the provisions of the Fair Labor Standards Act, it being their contention that they were not engaged in commerce, or the production of goods for commerce, and therefore, were not required to do so. None of the goods produced by the defendants were shipped out of the State of Missouri either by them or by any other person who purchased said materials, and they were used exclusively in construction within the State of Missouri.

"The defendants sold a substantial portion of their products to the State of Missouri, to counties and other governmental units, to be used in the repair of motoring highways. They also sold substantial portions to the United States government or to persons holding contracts under the United States government for use in the building of dikes, revetments and other types of construction in the Missouri river, an instrumentality of

interstate commerce. Plaintiff contends that such use of the rock brings the employes of the defendants within the provisions of the Act.

"Following a trial of the case, each side submitted well prepared and lengthy briefs, and thereafter argued the case orally. No cases directly determinative of the questions involved were presented to the court.

"Following the passage of the Act, and up until 1945 it was not contended by the Administrator that persons engaged in this type work (rock quarries such as the one in question here) were under the provisions of the Act, but in 1945 the Commissioner, by Executive Order determined that such employes were under the Act, and for that reason, now seeks to require compliance with the Act by these defendants.

"It is my view, and I hereby conclude that no portion of the said materials were moving in commerce, that the defendants were not producing goods for commerce, and for that reason, the employes of the defendants are not covered by the Act, and the plaintiff's complaint is dismissed.

"It is therefore ordered and adjudged by the court that the plaintiff take nothing by his suit, and that the defendants go hence without delay."

Garrison Dam

(Continued from page 73)

deposits in North Dakota and much closer to the construction site would be certified as to possibly yield a satisfactory fine aggregate. In the spillway, most of which is above water and open to view at all times, it was determined that fine aggregate containing a slight amount of alkali-reactive material could be used in combination with a low-alkali cement.

In the excavation work lignite coal seams have been encountered and some of this material is stockpiled nearby as a source of winter fuel. The lignite coal beds in North Dakota are a possible contaminant of fine and coarse aggregates in the immediate area.

Specifications for the aggregate for this dam parallel those in other dams under the Corps of Engineers, particularly the Ft. Randall job, except that the minus 2-in. material is a 100 percent crushed product.

Project Data

The 1951 estimated cost of Garrison dam is $268,000,000. Following are some of the important figures relating to the dam:

Length	12,000 ft.
Width, base	2600 ft.
Width, top	60 ft.
Height	210 ft.
Volume of earth fill	70,000,000 cu yd.
Volume of excavation	86,000,000 cu. yd.
Concrete	1,500,000 cu. yd.
Riprap	650,000 cu. yd.

Controls

Spillway

Type	Gated chute
Tainter crest gates	28—29 x 40 ft.
Length	1444 ft.

Control Tower
- Type ..... Reinforced concrete
- Height ..... 210 ft.

Tunnels
- Type ... Circular, concrete lined, west abutment
- Use ... Flood control, power, conservation
- Number and size—
  - Flood control 1—26 ft. and 2—22 ft. finished diameter
  - Power ..... 5—29 ft. finished diameter

Power
- 3 units, initially; capacity ..... 240,000 kw.
- 5 units, ultimately; capacity ..... 400,000 kw.

Reservoir
- Drainage area above dam ..... 180,940 sq. mi.
- Capacity
  - Maximum normal pool 23,000,000 acre-ft.
  - Flood control ..... 4,250,000 acre-ft.
  - Multiple purpose uses .. 13,850,000 acre-ft.
  - Dead storage ..... 4,900,000 acre-ft.
- Area
  - Maximum normal pool ..... 390,000 acres
    - Length ..... 200 miles
  - Minimum pool ..... 133,000 acres
    - Length ..... 120 miles

The town of Riverdale was built to house the personnel engaged in the design and construction of the dam. The town houses about 4000 persons and is modern and equipped with all facilities necessary for a town of this size.

Personnel

Garrison dam is being constructed by the Corps of Engineers, U. S. Army, under the supervision of the division engineer, Missouri River Division, Omaha, Neb. Design and field operations are being accomplished at the immediate direction of the district engineer, Ft. Lincoln, a suburb of Bismarck, N. D.

Lt. Col. R. J. B. Page is district engineer and B. N. Hannon is administrative officer, both with headquarters at Ft. Lincoln. At Riverdale are Lt. Col. Richard P. Davidson, assistant district engineer, and John W. Sibert, Jr., special assistant to the district engineer. Also located at the construction site are the engineering division with R. T. Hayes as chief, construction division under H. G. Hutchins, chief, and the concrete branch with M. R. Smith, chief.

The division testing laboratory for the entire Missouri river project is in Omaha, Neb. H. L. Weil is chief of the laboratory and E. J. Deklotz, concrete technologist.

Nonmetallic Bearings

THE ENGINEERING SOCIETIES LIBRARY, New York, N. Y. has announced the availability of an annotated bibliography of 101 selected references to the literature of the past 12 years concerning nonmetallic bearings. The bibliography covers all aspects of nonmetallic bearings, such as their manufacture, design, properties, wear, lubrication, performance, testing and applications, particularly of bearings made of rubber, wood, laminated phenolic plastics, resin-impregnated cotton fabric, micarta and nylon. This "ESL Bibliography No. 6" may be secured from the Engineering Societies Library, 29 W. 39th St., New York, N. Y. for $2 per copy.

Safety Experts

(Continued from page 101)

department. Machinery locks are identified by a yellow stripe. When a group is working on a job, the leader puts his lock on, and any workman may put his on also. Gang lock brackets have been provided to hold up to 12 locks, he said. The leader is responsible for seeing that all his men are clear before the switch is closed. The entire program was discussed in plant safety meetings, Mr. Lawrence said, and rules and a training program set up. Infractions could result in suspension or dismissal.

Mr. Riefenstahl quoted the cement industry's "Four Horsemen" of danger: moving machinery, high places, railroads and electricity. The great majority of accidents are due to these causes. Elimination of accidents involves the "E's" of safety, he said, which are engineering, education and enforcement. The modern approach to industrial safety substitutes education for strict enforcement, and utilizes visual aids and demonstrations. As an example of an effective visual aid, Mr. Riefenstahl repeated a demonstration used to show workmen the dangers of "itching" or "teasing" switches and how arcing burns contact points. A model switch consisting of a glass lamp guard filled with transformer oil was placed over a small knife switch. Throwing the switch rapidly would show the small size of arc produced, whereas "teasing" the switch would demonstrate the large arc and its ill effects. When the workmen were told that the model was only 1/500th or 1/1000th the scale of a large oil-immersed switch, repairs were rapidly reduced. The electric foreman prepared a "down-to-earth" paper to be used in conjunction with the demonstration before employes.

The speaker showed slides of a new design of screw conveyor cover plate and grating which he said has eliminated conveyor fatalities. The grating is bolted down to the conveyor housing, but the cover plate is loosely held down independently so that it will be forced up in case of a choke-up; the grating, however, will always remain in place and prevent injuries from contact with the screw flights. Other innovations and designs developed by their safety program, Mr. Riefenstahl said, included replacement of wooden ladders with aluminum units, development of a railroad bulk car latching tool, and a welding clinic to teach safe practices.

Safety On and Off the Job

The second day's meeting brought a symposium on safety problems of today and tomorrow. R. M. Cox, treasurer and general auditor, Ash Grove Lime & Portland Cement Co., Kansas City, Mo., discussed on-the-job safety, and A. H. Zeilinger, superintendent of safety, Colorado Fuel & Iron Corp., Pueblo, Colo., dynamically described his company's off-the-job safety program. Mr. Cox was of the opinion that a different safety viewpoint is now necessary. Formerly the adoption of mechanical safeguards, the writing of rules and practices and building safety organizations carried with it an evangelistic spirit. Now that mechanical and environmental causes have been reduced, it is necessary to influence the mental attitude, since the human element is now the major factor, he said. With visible proof of safety progress reduced, stimulus is lacking. This is manifested by the fact that most accidents now are due to lack of safety attitude rather than to lack of safety knowledge.

The question arises—how can we produce the proper safety attitude in employes? The worker's status has increased to the point where he can not always be told what to do. Instead, it is necessary to appeal to the individual's welfare, health and happiness. Before this can be attempted, Mr. Cox suggested that management must improve its safety attitude. The problem has narrowed down to producing the proper safety attitude in supervisors.

There are three steps in improving supervisors' safety attitude, which Mr. Cox listed as (1) learning, (2) living it, and (3) teaching it. In the learning process, proper knowledge is the foundation. Human relations have to improve for a worker to accept an idea. Conviction and effort are necessary to have others believe safety is worthwhile; thus it must be "lived." Workers will be encouraged to follow safe practices if supervisors "live" their safety beliefs. The workmen's efforts depend on the influence of the supervisor, and example, not words, is the important thing. Of greatest importance is proper teaching, and the degree of importance safety is given in the production picture. A poor job is often the result of poor teaching. For a supervisor to teach safety, he must know his subject. Teaching by influence is as valuable as teaching factual information, for a worker can't be taught if he doesn't want to learn. Every contact with the worker must be utilized.

Off-the-job safety is an aspect of the employe's life that most companies overlook, Mr. Zeilinger said. A study showed that employes at his company's plants were getting hurt off the job more often than on. Beside the humanitarian approach, reduction of these off-the-job accidents would directly help increase production. The first step Mr. Zeilinger took was to get the workers' wives to assist. They were invited to visit the plant and see their husbands at work. Then they were asked to make statements why they thought their husbands worked safely. Statements were printed in each issue of the company paper, along with a picture of each couple. In addition, a National Safety Council booklet, "Tips from Steel," was sent to every employe's home. This

booklet tells how a safety program works in a steel mill and suggests tips for home safety.

Speakers were sent to schools to tell about the plant work, and children were taken on plant tours. A bunch of kids can easily spot unsafe practices, according to Mr. Zeilinger. A simple thing like issuing the children safety goggles during the tour makes that a topic of conversation for weeks, and certainly reacts by bringing safety consciousness into the home of every employe, he said. Other important parts of the program include teaching first aid to the Boy Scouts, teaching employes how to avoid poison ivy, drowning and other pitfalls before they go on vacation, and panel discussions on the prevention of accidents.

Safety consciousness is also maintained by passing out book matches each pay day, in which one letter of the word "safety" is hidden underneath the staple. When an employe has collected the letters to spell "safety" he can turn them in to the company and receive two theater tickets as a prize. The entire company safety program, Mr. Zeilinger repeated, is designed to keep safety always in the minds of the employes and their families, both on and off the job. Any lesser program is insufficient, he maintained.

The final speaker at the Cement and Quarry Section meeting was Charles R. Zeskey, Jr., chief engineer, T. H. Mastin & Co., Kansas City, Mo., who suggested a practical safety training program for small organizations. Basic elements of any safety program are the same for all industries, he said. First is the importance of good instruction. Training should be continuous and broken down into segments; the safety engineer must instruct the owner or operator who in turn teaches the supervisors, who train the foremen, who train the workers. The type of training will vary with the level of the job.

Mr. Zeskey described a safety program in effect at a Mississippi saw mill, the only program of its type, to his knowledge. Only posters and the general supervisor's instruction are used, yet there has been only one lost-time accident in four years among more than 100 employes. The method is simple: each new man hired must begin working in the mill yard. Then as he learns the easier jobs, he may progress to the more difficult, learning the safety measures in the process. Thus all promotions are from within.

Executive Committee

Members of the executive committee of the Cement and Quarry Section for 1951-1952 include the following: general chairman, Lea P. Warner, Jr., Warner Co., Philadelphia, Penn; vice-chairman, M. C. M. Pollard, National Gypsum Co., Buffalo, N. Y.; secretary, Kent Jander, National Lime Association, Washington, D. C.; News Letter editor, Seymour Fleming, New

York Trap Rock Corp., Newburgh, N. Y.; engineering committee chairman, L. D. Cowling, Louisville Cement Corp., Speed, Ind.; membership committee chairman, T. W. Jones, New Haven Trap Rock Co., New Haven, Conn.; program committee chairman, Harvey F. Yotter, The General Crushed Stone Co., Easton, Penn.; statistics committee chairman, Forrest T. Moyer, U. S. Bureau of Mines, Washington, D. C.; and visual aid chairman, H. F. Collins, Lehigh Portland Cement Co., Allentown, Penn.

Members-at-large for the section are V. P. Ahearn, National Sand and Gravel Association, Washington, D. C.; E. W. Bauman, National Slag Association, Washington, D. C.; J. R. Boyd, National Crushed Stone Association, Washington, D. C.; F. J. Buffington, New York Trap Rock Corp., Newburgh, N. Y.; P. N. Bushnell, Universal Atlas Cement Co., New York, N. Y.; R. E. Copeland, National Concrete Masonry Association, Chicago, Ill.; A. J. R. Curtis, Portland Cement Association, Chicago, Ill.; W. E. Wing, Marblehead Lime Co., Chicago, Ill.; F. R. Dittoe, The Kelley Island Lime and Transport Co., Cleveland, Ohio; O. M. Graves, The General Crushed Stone Co., Easton, Penn.; C. A. Gustafson, The Callanan Road Improvement Co., South Bethlehem, N. Y.; Ivan LeGore, Portland Cement Association, Chicago, Ill.; John Mather, Lone Star Cement Corp., New York, N. Y.; Johan Norvig, Pennsylvania-Dixie Cement Corp., Nazareth, Penn.; Walter J. Scahill, Missouri Portland Cement Co., St. Louis, Mo.; and Robert Teichman, Gypsum Association, Chicago, Ill.

Cement Freight Challenged

THE FEDERAL GOVERNMENT has filed a complaint with the Interstate Commerce Commission against four railroad companies, claiming overcharges for the hauling of cement to Hungry Horse dam, Mont., according to a recent report in *Engineering News-Record*. The government is seeking lower rates for the future and repayment for the overcharges claimed. Between $567,000 and $756,000 in freight charges are involved. The railroad companies involved are Great Northern Railway Co., Northern Pacific Railway Co., Chicago, Milwaukee, St. Paul and Pacific Railroad Co. and Spokane International Railroad Co.

A similar complaint on freight charges for shipments of cement from Trident to Coram, Mont., is also being filed with the Board of Railroad Commissioners of the State of Montana.

Truck Maintenance

GENERAL MOTORS CORP.'s Truck & Coach Division recently announced the publication of a booklet, "GMC's Tips to Truckers in the Emergency." The booklet is being distributed to truck owners to help them prevent breakdowns and costly delays in their operations. The booklet gives advice on preventive maintenance for trucks, a system originated by G.M.C. in 1928, adopted by the armed services during World War II and, since then, promoted widely on the plan that "an ounce of prevention is worth a pound of cure."

Ends Quarry Operations

DENVER CRUSHED STONE CO., Denver, Colo., has suspended operations at its quarry on North Table mountain. For the past 2½ years the company has been mining basalt from the North Table mountain site and, during that time, about 750,000 tons of rock have been shipped from the quarry. It was stated that operations were suspended because of lack of markets.

STATEMENT OF THE OWNERSHIP, MANAGEMENT AND CIRCULATION, REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (TITLE 39, UNITED STATES CODE, SECTION 233)

Of ROCK PRODUCTS, published monthly at Chicago, Ill., for October 1, 1951.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Maclean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.

Editor—Bror Nordberg, 309 W. Jackson Blvd., Chicago 6, Ill.

Managing Editor—None.

Business Manager—E. R. Gauley, 309 W. Jackson Blvd., Chicago 6, Ill.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership, or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Maclean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill. The stockholders of the Maclean-Hunter Publishing Corp. are E. R. Gauley, 5240 Sheridan Road, Chicago 40, Ill.; H. K. Davis, 6920 S. Green St., Chicago 21, Ill.; F. S. Chalmers, 86 Chestnut Park, Toronto, Ont., Canada; Horace T. Hunter, 120 Inglewood Drive, Toronto, Ont., Canada; The Maclean-Hunter Publishing Co., Ltd., 481 University Ave., Toronto, Ont., Canada.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was (This information is required from daily publications only.) . . . .

E. R. Gauley,
Business Manager

Sworn to and subscribed before me this 25th day of September, 1951.

[SEAL.]

M. E. Johnston
(My term expires October 22, 1953.)

Kiln Efficiencies

(Continued from page 87)

deg. F. This condition is presented at point (1) of the figure.

To the right of the point a terminal temperature of 535 deg. F. is indicated, to the left a temperature of 2035 deg. F. at which the gases leave the calcining zone.

At point (2) at the base of the chart the calcining zone heat loss is given for normal products of combustion and CO_2 from the lime only, the loss being 6000 B.t.u. per lb. of coal fired.

If the gases had left the calcining zone at 1500 deg. F., that is at zero terminal differential, the loss as indicated by point (3) would have been only 3768 B.t.u. The difference between (2) and (3) is 2232 B.t.u.

From this the lime loss equivalent due to the differential can be readily calculated as follows:

$$\frac{2232 \times 1.4}{1310 \times 2.8} \times 100 = 85.3 \text{ percent of}$$

prevailing lime production capacity.

In the above, the 2232 is the high temperature elevation heat loss and the multiplier 1.4 adds the low temperature elevation heat component entering calcination. The 1310 is the heat of calcination per lb. of lime and 2.8 is the ratio obtained under these wasteful conditions.

In the next article of this series the cooler radiation loss and stack loss will be dealt with in similar detail and the various losses summarized.

Limestone Quarry

HOLDER CREEK QUARRIES CO. recently announced plans for operation of a limestone quarry at the Holder Creek bridge on Highway 65, near Marshall, Ark. The quarry will be operated for the production of agricultural and commercial limestone.

The quarry was formerly operated by the Arkansas Highway Department which will continue to operate blacktop processing and premix equipment and bins there. The new operators will convey the stone from the quarry to the crusher and into the processing bins as needed, saving the state the expense of storing the materials.

Moves Offices

NORTH MILWAUKEE LIME & CEMENT CO., Granville, Wis., has announced the removal of its offices to 1136 E. North Ave., Milwaukee, Wis.

Correction

IN THE ARTICLE, "Missouri Portland Cement Co.'s New Wet Process Plant," ROCK PRODUCTS, August, 1951, page 127, the last sentence in the author's note should read: "One of the fine traditions of the portland cement industry is its free exchange of ideas, and many of the features described are adaptations or improvements of something used elsewhere."

FINANCIAL

RECENT DIVIDENDS

Basic Refractories, Inc.—Q	$ .25	Sept. 15
Bessemer Limestone & Cement Co.—Q	.50	Oct. 1
Blue Diamond Corp.	.15	Sept. 26
Calaveras Cement Co.	.25	Sept. 15
California Portland Cement Co.	.40	Oct. 25
Canadian Cement Co., Ltd. 6½% pf.—Q	.32½	Sept. 20
Consolidated Cement Corp. —Class A	1.05	Sept. 29
Coronet Phosphate Co.	1.50	Sept. 29
Diamond Portland Cement Co.—Q	.25	Sept. 10
General Portland Cement Co.	.50	Sept. 29
Giant Portland Cement Co.	.12½	Oct. 1
Hercules Cement Corp.—Q	.25	Oct. 1
Keystone Portland Cement Co.—E	.25	Sept. 12
Keystone Portland Cement Co.—Q	.50	Sept. 12
Lawrence Portland Cement Co.—sp.	.50	Sept. 14
Lawrence Portland Cement Co.—Q	.25	Sept. 14
Lehigh Portland Cement Co.—Q	.30	Sept. 1
Lone Star Cement Corp.	.35	Sept. 28
Marquette Cement Mfg. Co.	.20	Sept. 5
Medusa Portland Cement Co.	.60	Oct. 5
National Gypsum Co.— —$4.50 pf.—Q	1.12½	Sept. 1
Nazareth Cement Co.—Q	.25	Sept. 15
Pacific Coast Aggregates, Inc.—pf.—Q	1.12½	Oct. 15
Peerless Cement Corp.—sp.	.12½	Sept. 14
Penn-Dixie Cement Corp.	.40	Sept. 14
Pennsylvania Glass Sand Corp.—Q	.25	Oct. 1
Pennsylvania Glass Sand Corp.—pf.—Q	1.25	Oct. 1
Standard Silica Corp.—Q	.12½	Nov. 15
United States Gypsum Co.—E	1.50	Oct. 1
United States Gypsum Co.—Q	1.00	Oct. 1
United States Gypsum Co. —7% pf.—Q	1.75	Oct. 1
Warner Co.	.40	Oct. 15
Whitehall Cement Mfg. Co.— new	1.00	Sept. 28

PENN-DIXIE CEMENT CORP., New York, N. Y., has reported income for the three months ended June 30, as follows:

	1951	1950
Net sales	$ 7,137,180	$ 6,259,899
Cost and expenses	4,707,988	4,338,287
Deprec. and deplet.	204,497	200,352
Operating profit	2,224,695	1,721,260
Other income, net	46,648	125,943
Total income	2,271,343	1,847,203
Interest	9,390	15,339
Federal income tax	1,365,000	691,000
Net profit	896,953	1,140,864
Earn., common share	$1.49	$1.89
No. of common shares	602,136	602,136

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has reported its account of income for the 12 months ended June 30, as follows:

	1951	1950
Net sales	$20,671,449	$19,007,244
Other revenues	1,513,355	1,284,042
Total	22,184,804	20,291,286
Cost of sales, etc.	12,826,815	13,207,897
Selling, etc., expenses	2,372,367	2,310,189
Other expenses	503,358	294,925
Net earnings	6,482,264	4,478,275
Interest	186,310	128,952
Income taxes	2,982,703	1,674,512
Net profit	3,313,250	2,674,810
Earn., preferred share	$20.39	$40.79
Earn., common share	3.90	7.74
No. of preferred shares	162,475	65,582
No. of common shares	800,000	320,000

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., for the six months ended June 30, has reported the below statement of income:

	1951	1950
Sales	$23,909,526	$19,196,631
Net before taxes	6,917,638	4,598,564
Federal income tax	4,290 000	1,805,000
Net profit	2,627,638	2,793,564
Earn., common share	$1.38	$2.93
No. of common shares	1,901,560	950,780

BASIC REFRACTORIES, INC., Cleveland, Ohio, has reported a net profit of $260,106 for the six months ended June 30, 1951, or $.74 per common share on 355,000 shares. This compares with a net profit of $402,5[illegible] for the same period in 1950, or $1.1[illegible] per share. Net sales for the 1951 period were listed as $6,182,863, compared with $4,651,839 for the 1950 period.

UNITED STATES GYPSUM CO., Chicago, Ill., has reported income for the six months ended June 30, as follows:

	1951	1950
Net sales	$97,562,915	$79,421,162
Cost of sales	58,428,334	46,075,853
Selling, etc., expenses	8,624,570	7,646,995
Deprec. and deplete.	2,564,527	2,493,446
Net earnings	27,945,484	23,204,868
Secur. income	459,813	324,161
Other income, net	109,213	125,710
Total income	28,514,510	23,654,739
Income taxes	13,567,000	9,789,000
Excess profits tax	3,622,000	
Net income	11,325,510	13,865,739
Earn. surp., 1-1	87,045,242	76,330,848
Preferred dividends	273,777	273,777
Common dividends	3,199,504	4,798,971
Earn. surp., 6-30	94,897,471	85,123,839
Earn., preferred share	$144.79	$177.26
No. of preferred shares	78,222	78,222

CERTAIN-TEED PRODUCTS CORP., Ardmore, Penn., has reported its account of income for the six months ended June 30, as follows:

	1951	1950
Net sales	$33,140,798	$23,353,578
Net profit	2,786,931	2,532,874
Earn., common share	$1.71	$1.54
No. of common shares	1,623,829	1,623,729

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, for the six months ended June 30, reports the following statement of income:

	1951	1950
Sales	$ 9,151,665	$ 7,088,090
Cost of sales	5,837,865	4,730,468
Selling, etc., expenses	990,806	893,842
Deprec. and deplet.	492,347	398,293
Operating profit	1,830,647	1,065,486
Other income	20,834	25,308
Total income	1,851,480	1,090,794
Other deductions	12,231	10,203
Federal income tax	1,230,000	400,000
St. and Can. inc. tax	54,700	15,000
Net profit	554,549	665,591
Earn., common share	$2.49	$3.76
No. of common shares	222,417	176,887

PEERLESS CEMENT CORP., Detroit, Mich., has reported income for the six months ended June 30, as follows:

	1951	1950
Net profit	$655,544	$439,354
Dividends	310,066	232,547
Balance	345,478	206,807
Earn., common share	$2.11	$1.42
No. of common shares	310,062	310,062

GENERAL PORTLAND CEMENT CO., Chicago, Ill., for the six months ended June 30, reported the following statement of income:

	1951	1950
Net sales	$14,740,500	$11,830,100
Cost and expense	8,961,000	6,711,300
Operating profit	5,779,500	5,118,800
Other income, net	*dr* 45,000	12,100
Total income	5,734,500	5,130,900
Federal income tax	2,690,000	2,150,000
Excess profits tax	589,000	
Net profit:		
March quarter	1,162,300	1,436,000
June quarter	1,293,200	1,544,900
6 months	$ 2,455,500	$ 2,980,900
Earn., common share:		
March quarter	$1.12	$1.38
June quarter	1.24	1.48
6 months	$2.36	$2.87
No. of common shares	1,039,971	1,039,971

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., for the quarter ended June 30, 1951, reports a net profit of $249,878, compared with $166,321 for the corresponding period of 1950. Earnings per common share for the 1951 period amounted to $.32 on 736,967 shares, as against $.20 per common share on 736,973 shares for the same period in 1950. Earnings per preferred share for the 1951 period were $19.17 on 13,033 shares, compared with $11.89 per share on 13,985 shares for the 1950 period. Sales were

listed as $4,609,192 for the 1951 period and $4,076,796 for 1950.

THE KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, has reported a net profit of $292,000, or $.94 per share on 308,952 shares, for the first six months of 1951. This compares with a net profit of $369,834, or $1.20 per share, for the corresponding period of 1950. Net sales for the first half of 1951 were $5,741,045, as against $4,683,306 for the first half of 1950.

LONE STAR CEMENT CORP., reports consolidated earnings for the six months ended June 30, as follows:

	1951	1950
Sales	$33,697,205	$30,561,766
Operating profit	11,122,465	9,342,745
Total income	11,464,880	9,678,778
Profit bef. income taxes	9,694,187	7,923,547
Federal and foreign income taxes	5,261,025	3,180,934
Federal exc. profit taxes	900,000	
Net profit	3,533,162	4,742,613
Earned per share	$1.24	$1.67
No. capital shares	2,845,791	948,597

WARNER CO., Philadelphia, Penn., has reported its account of income for the six months ended June 30, as follows:

	1951	1950
Gross sales	$10,694,149	$ 9,239,476
Income before taxes	2,556,060	2,240,960
Provision for taxes	1,418,500	897,0 0
Net income	1,137,560	1,343,960
No. of common shares	474,329	474,329
Earnings per share	$2.39	$2.83

LONGHORN PORTLAND CEMENT CO., San Antonio, Texas, lists a net income for the first half of 1951 as $534,370, compared with $724,815 for the same period in 1950. This was equal to earnings of $1.07 per common share on 499,160 shares for the period ending in 1951, compared with $1.45 per share for the 1950 period. Net income before federal taxes was listed at $1,252,423 for the first six months of 1951, and $1,170,258 for the like period of 1950.

LAWRENCE PORTLAND CEMENT CO., New York, N. Y., has given the following income account for the year ended June 30:

	1951	1950
Net sales	$ 9,075,400	$ 8,153,675
Net profit bef. taxes	2,168,053	1,407,006
Prov. for federal taxes	1,001,000	532,420
Prov. for federal ex. prof. taxes	240,000	
Net profit	927,053	874,585
Earned per share	$4.12	$3.89
Shares outstanding	225,000	225,000

NEW ENGLAND LIME CO., Adams, Mass., for the six months ending June 30, 1951, reports a net profit of $77,902, compared with a net profit of $86,876 for the same period in 1950. This is equal to $1.12 per common share on 69,622 shares for the 1951 period and $1.27 per share on 68,622 shares for the 1950 period. Net sales for the first six months of 1951 totaled $1,061,498, as against $874,010 for the first six months of 1950.

CONSOLIDATED CEMENT CORP., Chicago, Ill., has listed a net profit of $207,600 for the first six months of 1951, as against a net profit of $165,000 for the same period in 1950. This amount to $2.08 per class A share on 99,916 shares for the 1951 period and $1.65 per share for the 1950 period. Net sales totaled $2,290,800 for the first half of 1951, compared with $1,985,200 for the first half of 1950.

MANUFACTURERS NEWS

The Lincoln Electric Co., Cleveland, Ohio, has announced that L. K. Stringham, director of welding development and member of the board, has been appointed chief engineer for the company. G. G. Landis continues as engineering vice-president.

Independent Pneumatic Tool Co., Aurora, Ill., has appointed William V. Shakespeare sales manager of the Thor export sales division. Mr. Shakespeare has been a field engineer in the division for the past 15 years.

Link-Belt Co., Chicago, Ill., has announced that Robert C. Becherer has been elected executive vice-president of the concern, with headquarters at the executive offices in Chicago. Richard E. Whinrey, assistant general manager at the Ewart plant, Indianapolis, Ind., has been appointed general manager of this plant to succeed Mr. Becherer in this capacity.

New York Belting and Packing Co., Passaic, N. J., has announced the appointment of Wengel A. Lindfors as sales manager, with headquarters in Passaic. Until the time of his appointment, he was factory representative for the company in Minnesota, northern Wisconsin, North and South Dakota and northern Iowa.

General Electric Co., Schenectady, N. Y., has announced the appointment of J. Herbert Behm as staff assistant to the manager of engineering of the small apparatus division, with headquarters at Lynn, Mass. Mr. Behm recently had been appointed assistant to the manager of fractional-horsepower motor engineering.

Hendrick Mfg. Co., Carbondale, Penn., has announced the celebration of its 75th anniversary. A folder commemorating its history is being distributed by the company, and a copy will be mailed to anyone who writes to the Carbondale office.

The Timken Roller Bearing Co., Canton, Ohio, has announced the appointment of George T. Humphrey, Jr. to the post of assistant general manager of the service sales division. Mr. Humphrey formerly was assistant branch manager of the service sales division of Dallas, Texas.

Caterpillar Tractor Co., Peoria, Ill., has announced the recent death of C. L. Best, pioneer inventor and tractor builder, at the age of 73. One of the founders of the company, he was chairman of the board and member of the executive committee at the time of his death. Mr. Best formed the C. L. Best Tractor Co. in 1910 at Elmhurst, Calif. Mr. Best continued as president of his firm until 1925, when it and the Holt Mfg. Co., with a branch factory in Peoria, were merged to form Caterpillar Tractor Co., and he became chairman of the board.

C. L. Best

R. G. LeTourneau Inc., Peoria, Ill., has announced that Roy E. McCluskey, vice-president and general manager, has been elected to the board of directors of the International Road Federation, which has been designated as spokesman for the highway industry and associated manufacturers in connection with the foreign programs of the ECA.

Signode Steel Strapping Co., Chicago, Ill., has announced the transfer of James R. Elsinger, company representative, from Atlanta, Ga., to its Baltimore district. He will reside in Richmond, Va., and will service part of Virginia and all of North Carolina.

Worthington Pump & Machinery Corp., Harrison, N. J., announces that A. H. Borchardt has been elected a vice-president of the company. He was formerly assistant vice-president and manager of centrifugal pump application. W. Clifford Mumford has been appointed manager of the vertical turbine pump sales division. Since 1946 he was assistant to the late Frank Kemp, and has been acting manager of the division since Mr. Kemp's death. Fenmore E. Dunn, formerly consulting sales engineer has been named assistant manager of the vertical turbine pump division. J. W. Hepburn continues as assistant manager of the vertical turbine pump

sales division at the Denver, Colo., works. William J. Fleming has been named manager of the construction equipment sales division, and John S. Bachman continues in charge of field sales as assistant manager, with headquarters at the Dunellen Works, Dunellen, N. J. Herman H. Miller has relinquished his position as manager of the compressor division to act as consultant to his successor, E. A. Murray, who has been assistant manager of the division since 1948. Mr. Miller, who has served the company for 50 years, plans to retire at the end of the year.

Harnischfeger Corp., Milwaukee, Wis., plans construction of a new factory and office building in Crystal Lake, Ill., for the production of diesel engines ranging in size from 1 to 6 cyl. The main office of the division will be at Crystal Lake and Karl Schoeppner, who was appointed eight years ago to develop the diesel program, will be general manager. He will also continue in charge of the present diesel plant at Port Washington, Wis.

Caterpillar Tractor Co., Peoria, Ill., announces that the service department recently inaugurated its largest training program for army personnel since World War II, under contract with the U. S. Corps of Engineers. The program included two weeks on diesel engines, three weeks on transmissions, and a week on the rehabilitation of parts.

The J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan., has opened sales offices in Chicago, Ill., and Fort Worth, Texas. J. R. Rosenleaf, formerly chief engineer for the company, is sales representative for the Chicago area which comprises all of Illinois north of Springfield, Indiana north of Terre Haute, and Wisconsin south of a line north of Milwaukee and Madison. The Texas territory includes all of Texas except the Panhandle, and R. K. Yancey has been appointed district sales representative for that area.

The Buda Co., Harvey, Ill., announces the election of L. F. Shoemaker as vice-president of the company. He became associated with the Buda Co. 31 years ago and has held positions in service, new engine field test, retail sales and manufacturers sales departments. For the last 12 years, he has been manager of industrial engine sales division and engine sales manager.

Harnischfeger Corp., Milwaukee, Wis., has produced a sound-color slide film "The Fourth Man," pointing out the need for economy in our national budget. It is sponsored by Walter Harnischfeger, president, and may be borrowed by any groups or clubs interested in the subject. Narrated by radio announcer Andre Baruch, the film explains the responsibility of business, labor and agriculture in seeing that the "fourth man," government, keeps the budget balanced. The film recently received the Freedoms Foundation Honor Medal Award.

INDUSTRY NEWS

New Association

THE EMPIRE STATE Sand, Gravel

Standardization of wall panels throughout the structure created a design situation ideally suited to the tilt-

CLARY-COTE READY-MIX, Eldora, Iowa, began operation of its new ready-mixed concrete plant, October 1. Facilities include a mixer plant plus two truck mixers. E. J. Clary and C. W. [illegible] the owners. Mr. Clary nd operates Clary Con- als Co. and a sand and ıg plant at Gifford, Iowa.

ONCRETE PRODUCTS Co., has been sold to William ınd Frederick H. Frank ſll. Harry Pinson and tt were the former own- ıtors.

PRODUCTS, INC., recently ons at its new concrete Beckville, Penn. Both forced concrete pipe are d in sizes ranging from n diameter. The process McCracken packer-head ıt has four large curing

PIPE CO., East Orange, ding a new plant near S. C., for the produc- size, reinforced concrete d in construction at the y Commission's Savan- ject. About 300 people ed at the new plant.

MANUFACTURING AND plant at Nashville, ently damaged by a fire rom a steam generator. stimated at $150,000.

K Co., Richmond, Va., t damages resulting re at its plant amount- 000. Exact cause of the n determined, but it is e been caused by spon- stion from work cloth- a locker room. About of machinery was in ortion of the building, ıght that much of the d still be used.

CK Co. recently began its new plant in Clo- luded in the equipment brapac block machine ble of producing 800 hr., or 8000 brick. A ilding is being erected ipment for cold weath- d Brenny is owner and plant.

UCTS, INC., Elmwood doubled its plant ca- system for processing includes the installa- ge magnets for iron n installed. The plant cinder and concrete block.

FALLON CONCRETE PRODUCTS CO., Hawthorne, Nev., is now under the sole ownership of Wendell Wheat who purchased the interests of his partner, Leonard Mackedon. The deal concluded the partnership which had been carried on for 2½ years after the two had bought the business.

AGES

SSING

ance was recently achieved with the completion of a 36,000 sq. ft. Los Angeles manufacturing building, enclosed by 20-ton concrete tilt-panel walls. Erection of the building was handled by MacIsaac, Menke & Roach, Inc., who completed the structure in a total of 70 construction days from date of awarding the contract.

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INDUSTRY NEWS

New Association

THE EMPIRE STATE Sand, Gravel and Ready-Mix Association was recently formed in New York State. H. A. Barney, Barney & Dickenson, Inc., Vestal, N. Y., is the first president of the new association. Other officers include Leon Wendel, Gasport Sand & Gravel, Lockport, N. Y., vice-president; William Nass, Syracuse Ready Mix Co., Syracuse, N. Y., secretary; and John Hopkins, Albany Gravel Co., Albany, N. Y., treasurer.

Plant Expansion

ROLLE READY-MIX AND CEMENT BLOCK CO., Chisholm, Minn., founded by Dario Rolle and his brothers, Edward and Richard, in 1947, has increased capacity to a considerable extent. The original plant, known as Chisholm Concrete Block Co., was destroyed by fire in January, 1948, but has since been rebuilt and a ready-mixed concrete plant added.

In the last three years, plant capacity has been increased from 50 to 60 cu. yd. of concrete and 1000 block per day to 250 cu. yd. of concrete and 3000 block. The company started with one dump truck, but now has five transit mixers, two dump trucks, a shovel-loader, a truck lift and a pickup truck. The company has also added its own loading facilities which involved laying 800 ft. of railroad track served by the D.M. & I.R. railway. The company is now undertaking its biggest single job—that of supplying 10,000 cu. yd. of ready-mixed concrete for the Chisholm street paving project.

Concrete Sewer Booklet

THE PORTLAND CEMENT ASSOCIATION recently announced the publication of a 48-page booklet entitled "Concrete Sewers," designed primarily as a reference book for sanitary engineers. It contains a number of tables and charts and information on the design and construction of concrete sewer systems which includes the latest available research data covering loads on sewer conduits. Also included is a chapter on maintenance and repair of sewer lines and safety precautions in sewer operations.

Individual copies of "Concrete Sewers" are available only in the United States and Canada on request to the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Ill.

Concrete Tilt-Panel Walls

A RECORD CONSTRUCTION performance was recently achieved with the completion of a 36,000 sq. ft. Los Angeles manufacturing building, enclosed by 20-ton concrete tilt-panel walls. Erection of the building was handled by MacIsaac, Menke & Roach, Inc., who completed the structure in a total of 70 construction days from date of awarding the contract.

Standardization of wall panels throughout the structure created a design situation ideally suited to the tilt-up method of construction. A total of 42 slabs, 6 in. thick and averaging 20 x 25 ft. in size with some going as high as 31 ft., were lifted into place. A 40-ton crane was used for the operation.

Unique Zoning Provisions

V. E. SCHEVENELL, South Memphis, Tenn., was recently granted a zoning variation on property fronting Frisco St. for the purpose of building a batching plant for the production of ready-mixed concrete. The zoning permit was granted after Mr. Schevenell agreed to certain conditions: to dedicate approximately 5 ft. of frontage for the widening of Frisco St., to build sidewalk along his Frisco frontage; and not to use Charjean Road (running south off Frisco St.) in delivering ready-mixed concrete, unless the truck delivery is being made to some point on Charjean Road itself. These agreements were made to satisfy nearby property owners who were objecting to the proposed plant site.

Interlock Concrete Block

INTERLOCK BLOCK CO., Erie, Penn., a new corporation, has begun production of a new interlock concrete block invented by Julius Lewis. The block have passed all required tests and have the approval of the Pittsburg Laboratories in Buffalo, N. Y. The block, laid without mortar, are locked together securely and are said to make a rigid dry wall which will sustain all loads as required by standard tests. The cost of the block is slightly higher than that for standard concrete block, but the saving in construction time is said to be considerable. The block are easily laid and it is claimed that any wall can be built by the owner himself.

Research Laboratory

A NEW LABORATORY has been built at the Armour Research Foundation of Illinois Institute of Technology for research to develop stronger, cheaper, and lighter concrete block. The new laboratory includes an air-conditioned, constant-temperature room, a preparation room, special concrete mixer, block-making machine and testing equipment.

Among researches there will be studies of concrete units made from a lightweight aggregate developed at the Foundation from expanded clay and shale. Loadbearing block also are to be the object of extensive research and special studies will be made to determine changes caused by freezing and thawing, wetting and drying, chemical action and water absorption. The laboratory also is equipped to do research on cement, lime and gypsum products.

CLARY-COTE READY-MIX, Eldora, Iowa, began operation of its new ready-mixed concrete plant, October 1. Facilities include a mixer plant plus two truck mixers. E. J. Clary and C. W. Cote are the owners. Mr. Clary also owns and operates Clary Concrete Materials Co. and a sand and gravel washing plant at Gifford, Iowa.

CANTON CONCRETE PRODUCTS CO., Canton, Ill., has been sold to William Buchannan and Frederick H. Frank of Peoria, Ill. Harry Pinson and James Herriott were the former owners and operators.

SCHYLKILL PRODUCTS, INC., recently began operations at its new concrete pipe plant at Beckville, Penn. Both plain and reinforced concrete pipe are being produced in sizes ranging from 12 to 60 in. in diameter. The process used is the McCracken packer-head type. The plant has four large curing rooms.

LOCK JOINT PIPE CO., East Orange, N. J., is building a new plant near Orangeburg, S. C., for the production of large size, reinforced concrete pipe to be used in construction at the Atomic Energy Commission's Savannah River project. About 300 people will be employed at the new plant.

CONCRETE MANUFACTURING AND SUPPLY CO.'s plant at Nashville, Tenn., was recently damaged by a fire which started from a steam generator. Damage was estimated at $150,000.

CINDER BLOCK CO., Richmond, Va., estimated that damages resulting from a recent fire at its plant amounted to about $50,000. Exact cause of the fire has not been determined, but it is believed to have been caused by spontaneous combustion from work clothing hanging in a locker room. About $175,000 worth of machinery was in the damaged portion of the building, but it was thought that much of the machinery could still be used.

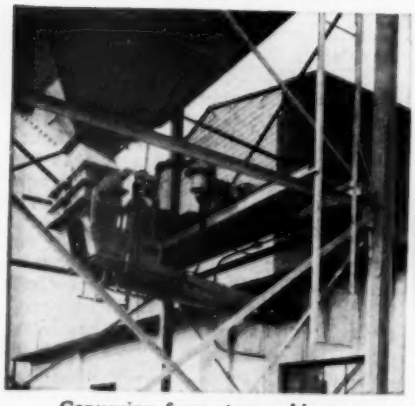
BRENNY BLOCK CO. recently began production at its new plant in Cloquet, Minn. Included in the equipment is a Besser Vibrapac block machine which is capable of producing 800 8-in. block per hr., or 8000 brick. A 60- x 120-ft. building is being erected to house the equipment for cold weather operation. Ted Brenny is owner and manager of the plant.

CINDER PRODUCTS, INC., Elmwood Place, Ohio, has doubled its plant capacity. A new system for processing cinders which includes the installation of two large magnets for iron removal has been installed. The plant produces both cinder and concrete block.

FALLON CONCRETE PRODUCTS CO., Hawthorne, Nev., is now under the sole ownership of Wendell Wheat who purchased the interests of his partner, Leonard Mackedon. The deal concluded the partnership which had been carried on for 2½ years after the two had bought the business.

Conveying from elevator to storage bin underneath floor

Open-type Airslide in bin bottom conveying to elevator



Conveying from storage bin to weigh scales in plant

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PA

MIS

flow—by gravity—like water. There are no moving parts—nothing moves but the material.

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DRY MATERIAL CONVEYING SYSTEMS AND COOLERS •
COMPRESSORS AND VACUUM PUMPS •
FEEDERS, AND ASSOCIATED EQUIPMENT

PH-25

f Standard Building Material Co. itching tower in the background, veyor carries aggregates from a eady-mixed concrete plant

AGES

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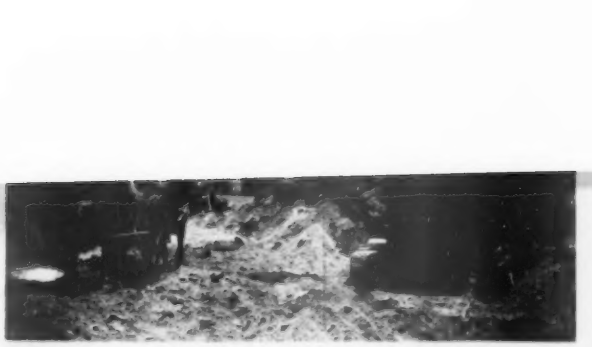
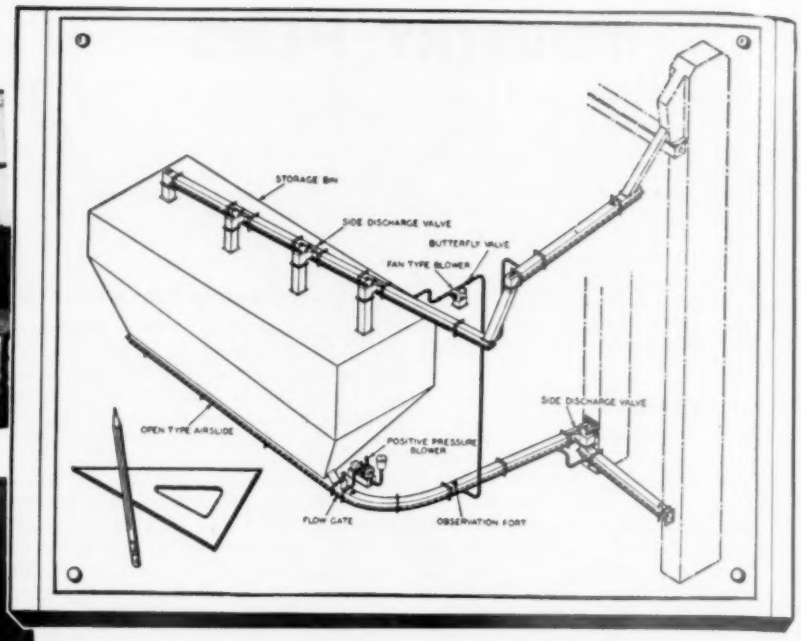


Standard has been in the building material field for a long time. Left: Hauling in the early days was done by horse-drawn wagons. Right: Trucks now haul out of the gravel pit overlooking the South St. Paul stockyards

Conveying from elevator to storage bin underneath floor

Open-type Airslide in bin bottom conveying to elevator

Conveying from storage bin to weigh scales in plant



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DRY MATERIAL CONVEYING SYSTEMS AND COOLERS • COMPRESSORS AND VACUUM PUMPS • FEEDERS, AND ASSOCIATED EQUIPMENT

FH-23

Standard Building Material Co., South St. Paul, Minn., combines many practical ideas into design of new concrete plant

Combination block plant and ready-mixed concrete operation of Standard Building Material Co. The block plant is in the foreground, ready-mixed concrete batching tower in the background, cement storage warehouse in right background. The main conveyor carries aggregates from a truck unloading hopper and underground tunnel to the ready-mixed concrete plant

Combination Block Plant and Ready-Mixed Concrete Operation

A LARGE NEW COMBINATION block plant and ready-mixed concrete operation, one of relatively few in this country, has been opened in South St. Paul, Minn., by Standard Building Material Co. Standard is the Northwest's pioneer block manufacturer, and has been turning out concrete block since 1909. It produces sand and gravel also, and except for the meat-packing houses is South St. Paul's largest industry. The ready-mixed concrete operation is conducted under the name of Standard Ready Mixed Concrete Co.

The high capacity combination plant occupies a 6-acre tract fronting on South Concord St., a main traffic artery. The land was formerly a useless swamp bordering the Mississippi river. When the company's fourth, and latest, pit was opened only three blocks away, the overburden was used to bring the swampland to street level.

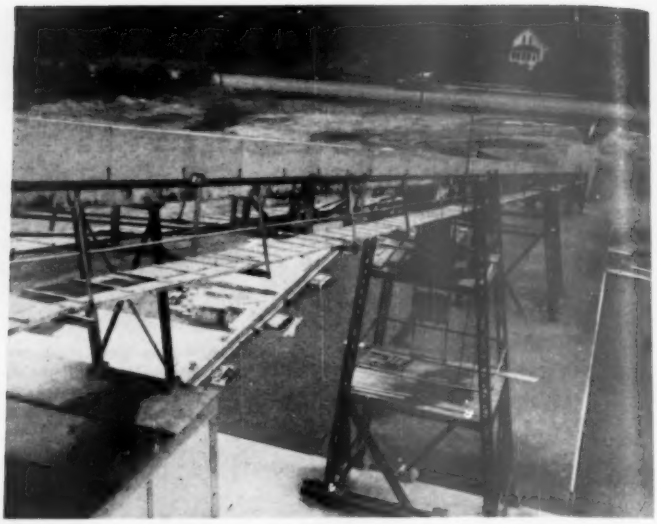
The block plant, located directly below the ready-mixed concrete tower, produces concrete block, concrete brick, and lightweight block of all styles and shapes. Standard was the first producer of lightweight block in the area. The automatic Butler ready-mixed concrete plant has a capacity of 96 cu. yd. per hr.

Both operations are connected by a common conveyor and common cement facilities. This is the only plant in the area with a straight gravity-drop system. The main conveyor, 356 ft. long, is channel-type construction. Angle of incline is 15 deg., reaching a point 80 ft. above ground level at the turn head. Belting is 24 in., 4 ply, 28 oz. The conveyor moves 150 cu. yd. of material an hour. Steam lines from the main power plant run the conveyor's entire length, to warm up the belt in winter, when necessary, and to thaw out lumps before they reach the ground storage hopper. This was felt to be a wise precaution because of the length of the conveyor and the severity of Minnesota weather. The troughing rollers and the head, tail, and take-up pulleys were made to order by Diamond Iron Works.

The main belt is supplemented by a 20-ft. horizontal feeder conveyor. In connection with this, there is a 200-cu. yd. truck hopper for storing aggregates at ground level. Aggregates are brought in by truck from the washing plant 1½ blocks away. The hopper has four compartments: one for concrete sand, one for ½-in. material, one for ¾-in., and one for 1¼-in. Materials are selected by gates feeding the conveyor.

This quantity ground storage has proved so practical that plans are in the making to increase capacity. The hopper and lower part of the conveyor are housed in a concrete block building, 26 ft. square, reinforced to support a 360-ton load. The concrete floor, which is 2 ft. below the river line, is pitched to a sump pump which takes out surface water and keeps the floor dry. A speaker system connects the underground tunnel with the ready-mixed concrete operation a block

Standard has been in the building material field for a long time. Left: Hauling in the early days was done by horse-drawn wagons. Right: Trucks now haul out of the gravel pit overlooking the South St. Paul stockyards



Left: Truck being loaded under the ready-mixed concrete plant of the Standard Ready Mixed Concrete Co. Right: The 356-ft. conveyor for aggregates is covered and steam lines run the entire length for easy winter operation

away; in fact, the entire operation is connected by speakers.

Ready-Mix Plant

The ready-mixed concrete plant, now used for transit-mixing, is also designed for pre-mixing equipment which will be added in the not too distant future. The tower is of completely fireproof construction. The enclosed platform covers 750 sq. ft. and is 33 ft. above grade. It has an insulated floor and large windows on three sides for good ventilation and light. There are facilities for testing trial batches and gradation of materials. Five storage bins have a capacity of 180 cu. yd. of sand and gravel and 300 bbl. of cement. Sand and gravel bins have steam coils for winter heating. The weighing plant is equipped with a 4-cu. yd. batching scale. A separate cement storage hopper has a capacity of 800 bbl. All bins are readily accessible by stairways so contents can be checked. There are two 1000-gal. gravity-flow water tanks, one for hot water for winter use. This comes preheated from the boiler room and is kept at 150 deg. F. The steam lines and water pipes are wrapped for insulation. Both tanks are at the same elevation so the water may be blended by gravity to meet temperature specifications. The platform enclosure is kept at 70 deg. F. in winter by steam unit heaters, electrically driven and controlled, which is not only more comfortable for the weighmaster and dispatcher, but helps to maintain a uniform temperature and flow of materials.

Block Plant

The block plant, the latest word in design and equipment, is of concrete masonry construction, 93 ft. wide and 174 ft. long. Its material storage facilities are entirely separate from the ready-mixed concrete and are of the same capacity. The plant has the latest style Besser Vibrapac machines. There is a 50-cu. ft. Besser mixer and a 2½-cu. yd. horizontal traveling batching scale.

Curing is done by steam, one reason for the 200-hp. boiler in the power plant; the other reason was to provide ample facilities for future expansion. There are 10 curing rooms, 20 x 35 ft. x 8 ft. 4 in. high. Each has its own moisture and temperature controls, and each has 8 sq. ft. of glass block for good daylighting.

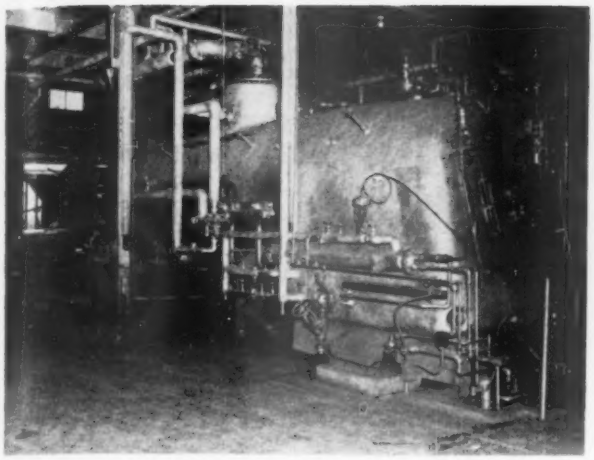
Office of Standard Building Material Co. The old concrete block plant is in the background

Curing room floors slope to the center aisle, and special attention was given to installing expansion joints in both floors and walls. The center aisle is 20 ft. wide and has a monitor-type roof, 22 ft. high. There is a grate floor drain down the entire length of the floor, sloped to a catch basin. Block are taken in and out with Clark lift trucks. Curing room doors are vertical type, made to order by Universal Door Carrier Co. Exterior doors of the building are overhead, so that trucks can be loaded inside in winter. The latter are 12 ft. wide and 14 ft. high.

The boiler room, a separate building at the north end, is the heart of the two operations. Here are housed the air compressors, water pump, two electrical distribution panels for the block and ready-mixed concrete plants, and all remote controls and compensating switches for the conveyor motors. This centralization simplifies making repairs. There are also toilet and washing facilities for employes, and a small emergency repair area. The building is only 30 x 46 ft., which shows the efficient use made of the floor space. The concrete floor slopes to five different drains, so the room can be hosed out daily. A 9-in. line carries roof and floor drainage to an outside ditch.

The 200-hp. boiler is from a locomotive, purchased, tender and all, from a railroad that was converting to diesels. The tender and driving mechanism were sold for scrap, and the boiler was carefully dismantled and equipped with National Airoil burners. All the former gauges are still in use. This is a high and low pressure boiler, fully automatic, burning No. 6 oil. An auxiliary steam-atomized oil burner serves as a standby. The boiler occupies a space 6 ft. 6 in. x 29 ft.

The operation has its own 300-ft. well, equipped with an automatic 400-g.p.m. Fairbanks-Morse turbine pump.



The 200-hp. boiler was converted from a locomotive

The block plant in operation

Certain valves can be shut off at the pump, and the water run directly to a fire hose. The buildings are fireproof, but are somewhat isolated from public fire-fighting equipment; and every effort has been made to make the plant self-contained. Water pressure of 125 p.s.i. can be developed. A direct line to the boiler permits the water system to be used for annual hydrostatic tests.

From American Tank Car Corp., Standard purchased two railroad tank cars that had been in a fire but not badly damaged. Each has a capacity of 8000 gal. One is used for fuel oil storage; the other, for a water pressure tank. These are buried underground.

Near the boiler room is an outside truck wash rack that accommodates four trucks at a time. It was placed on the edge of a bank so that surplus water can drain off to lower land. Hot and cold water and electric lines serving the rack are all underground. Trucks are greased each morning before starting the day, and washed at night. Standard believes that well-kept trucks reduce over-all maintenance costs and are good advertising.

Cement Storage

There is a modern cement storage warehouse at the south end of the operation. This warehouse, 34 x 80 ft., is also of reinforced concrete masonry construction. The roof is supported by steel I-beams to keep the floor area clear of columns. Capacity is ten carloads of sack cement. A 9 ft. overhang along the front dock provides weather shelter, and similar overhangs over the two rear doors on the spur track give protection there. Recessed angle iron offsets in the door sills for planks to the ledge of the box car floor expedite unloading. All doors are the overhead type. Room was left between the warehouse and the track for a surfaced road, so that cement can be unloaded directly into trucks if desired.

A 76-ft. enclosed conveyor at the north end of the warehouse unloads lightweight aggregate for the block plant. Gondolas are spotted over a track hopper, from which the aggregate goes on to the conveyor. The truck is backed under the conveyor, the driver pushes a control; and when his truck is loaded, stops the motor and drives over to one of the plant unloading bins. From there the material is run up all at once by the main conveyor.

Bulk cement is unloaded by an underground screw conveyor, 45 ft. long. This is covered with precast concrete sections that can be taken up readily to make repairs. The cement is taken either to the storage bin, the main hopper, or to the block shop bin. Total overhead bulk cement storage capacity is four carloads. There are also facilities for loading bulk cement into trucks.

Both of these conveyors are electrically operated. All electric cable (heavy duty to allow for future expansion) is carried in underground conduits outside, as well as inside the buildings, to keep areas clear for crane travel.

This well-integrated layout and all the buildings were designed by Walter H. Milnar, president of Standard Ready Mixed Concrete Co., and a designing engineer by profession. His experience with American Hoist & Derrick Co. and with C. [illegible] Johnston, architect, before coming with Standard, were good assets for so complex a project. The South St. Paul plant is a synthesis of the best features of many other plants visited by Mr. Milnar, plus ideas of his own.

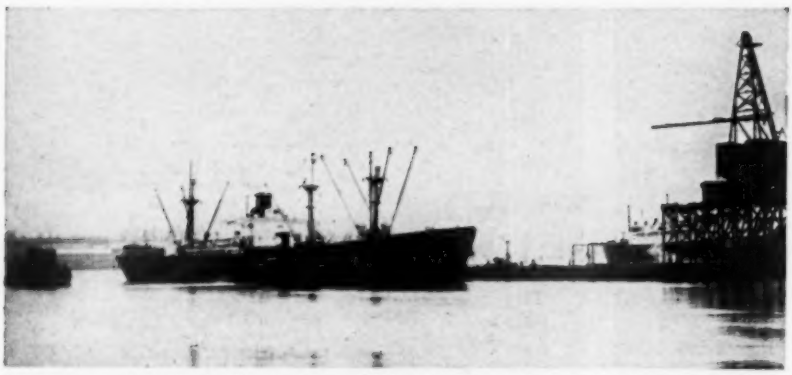
Sand and Gravel

The gravel pit operates from April 1 until the early part of November. Overburden, which averages 7 ft., is removed by an American Gopher dragline. Material is excavated by two American Gophers. Dump trucks haul the material to the plant hopper, which is spanned by a rail grizzly that rejects boulders over 10 in. Below the hopper, a feeder passes the minus 10-in. material on a conveyor belt to a two-deck dry scalping screen. The minus 1½-in. material passing through the first half of the two scalping screens is conveyed to the top of the washing plant for washing and sizing.

All plus 2-in. aggregate travels over the first scalping screen to a jaw crusher, and is reduced to 1½ in. Aggregate, 1⅝ to 2 in., falling

(Continued on page 138)

Standard Building Material Co. also operates its own crushing and washing plant



S. S. Pegor at anchor in Providence, R. I., with 19,000 cu. yd. of Santorin Island pumice for Cinder Products Corp.

Cinder Products Corp., Providence, R. I., imports pumice from Greece to relieve cinder aggregate shortage

By HUBERT C. PERSONS*

PUMICE BLOCK FOR NEW ENGLAND MARKET

WITH MOST CINDER BLOCK manufacturers in New England worried over the diminishing supply of cinder aggregate and studying the possibility of establishing a sintering plant to guard against a more critical shortage, there is one notable exception. That exception is Cinder Products Corp., Providence, R. I., which recently began using lightweight aggregate made in a sintering plant set up by nature thousands of years ago. A 19,000-cu. yd. shipment of pumice aggregate from an extinct volcano on Santorin Island in the Aegean Sea, off the Grecian coast, provides the basic ingredient of Cinder Products Corp. new "Lavacrete" block.

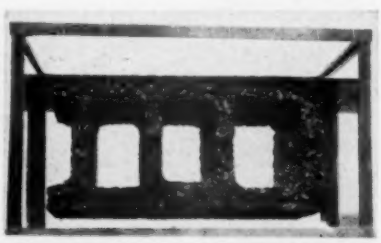
Royal Sterling, president of the company, calls this pumice aggregate the "world's oldest building material" both because of its prehistoric origin and because it was used by the ancient Greeks and in the Mediterranean countries before the Christian era.

A standard 8- x 8- x 16-in. concrete masonry unit made with the new pumice aggregate weighs approximately 20 lb. By taking out the fines and changing the gradation of the aggregate it is possible to produce block as light as 15 lb. The 15-lb. block will float in water, has a compressive strength above 800 p.s.i., shows high insulating value and excellent acoustic properties. The floating block shown in the photograph was designed especially for lightweight partition walls which are to be plastered. Since the walls are non-loadbearing, the block do not have to pass the 800 p.s.i. strength requirement. By using such a lightweight unit, a considerable amount of steel can be saved in the building.

Only one other plant in the United States is known to be using pumice aggregate from Santorin Island. That is Burnup & Sims, West Palm Beach, Fla., who mix it with coral aggregate.

Mr. Sterling had been searching for a new type of lightweight aggregate for many months when he learned that the Florida concern was using an aggregate from Greece. The Florida company readily agreed to send him a carload of the pumice for test runs. Test runs on a Besser Vibrapac convinced Mr. Sterling that he had found the aggregate for which he had been searching. Then through the State Department and the Greek consulate in New York he opened negotiations which resulted in Cinder Products Corp. placing an order for a shipload of the Santorin Island pumice.

Mr. Sterling explained that the freight rate on American pumice from the southwestern part of the United States was so high that the use of it was prohibitive. The company can import pumice from Greece and ship it into New York at a lower price than American pumice.



"Lavacrete" masonry unit floating in glass tank of water in the display room illustrates to customers the light weight of units made with pumice

Imported Pumice

The pumice reached Providence on the *S. S. Pegor* on April 16, 1951, after a three-week voyage of nearly 5000 miles. Getting it to the company's yards proved to be a task of some magnitude. Seven trucks, each carrying 12 to 15 cu. yd., worked night and day for more than a week to rear a veritable mountain of pumice on the company's aggregate storage area.

There is no limit to the supply of pumice available on Santorin Island, Mr. Sterling says. He expects his present supply to last for eight or nine months although he will sell some of it to other block manufacturers in the New England territory.

Santorin is a 300 or 400 ft. high volcanic mountain and has deep and steep gullies extending down to the water. At several points, one above the other, dams have been built across one of these gullies; there are gates in the dams. The lava rock is crushed at the top of the mountain and flows by gravity to the lowest reservoir behind the first dam. As each successive reservoir is filled, the gate above is closed and the next one filled. When all of these reservoirs are filled, taking about one month, it amounts to one shipload. From the bottom of the lowest reservoir a belt conveyor extends out and discharges directly into the hold of the ship. When the ship is loading, one side is touching the wall of the volcano and at the opposite side of the ship the water is 1200 ft. deep.

Lightweight Products

Cinder Products Corp. will continue to make cinder block and Celocrete

*Industrial public relations consultant, Chicago, Ill., for many years manager, Public Relations Bureau of the Portland Cement Association.

block as long as satisfactory aggregate is available, Mr. Sterling says, but he believes the trend in his territory will be strongly toward the new block.

In addition to wall units, the pumice aggregate can be used for lightweight floor and roof slabs. Using a 1:6 mix, the aggregate makes concrete with a density of about 40 lb. per cu. ft. The company believes it will be popular for interiors where acoustic properties are a serious consideration.

The block plant of Cinder Products Corp. operates with one Besser Vibrapac and four low pressure steam curing rooms. About 5500 block are turned out in one shift. The yard has storage space for half a million block, some of it under roof.

No Lavacrete block are permitted to leave the Cinder Products Corp. yards until it is thoroughly cured and shows a low moisture content. The company guarantees to the architect that Lavacrete block will be properly seasoned and cured before they are allowed to go on the job, even though the contractor may have to wait for material. The company sends frequent notices to all contractor customers, reminding them to order block well ahead of the time it will be needed on the job.

In addition to its block business, Cinder Products Corp. also is distributor for the Thoro System products, commonly known as Thoroseal, Quickseal and Waterplug. It is also distributor for a silicone base waterproofing.

Attractive Display Room

Buildings of the Cinder Products Corp. are of cinder block units laid with the vertical joints cut flush and the horizontal joints tooled to produce sweeping horizontal lines. They are painted with Thoroseal and Quickseal. In the sales office and display room (pictured on the front cover of CONCRETE PRODUCTS) the interior walls are of Celocrete laid in various types of coursing to show the wide range of attractive wall effects which may be achieved with concrete masonry.

Mr. Sterling is president and treasurer of the corporation. James H. Goddard of Boston and John C. Dinsmoor are vice-presidents. Mr. Goddard also serves as secretary. Leighton T. Bohl, engineering professor at Brown University in Providence, is a member of the board of directors.

New Plant

SIDNEY IDEAL STONE CO., Sidney, Neb., recently began operations at its concrete block plant. Among the products to be manufactured are pumice units. Alva Speer is the plant manager. Others associated with the company include Chris and Leonard Handley who have been operating Chappell Hollostone Co., Chappell, Neb., for several years.

Buildings of Cinder Products Corp. are made of cinder masonry units

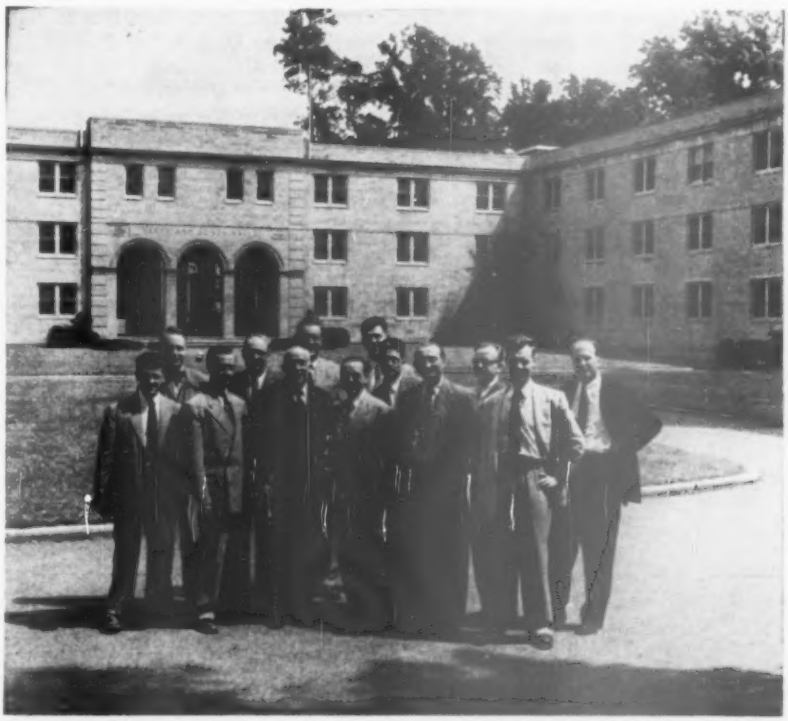
French Group Study U. S. Concrete Masonry

THE TECHNICAL MISSION FROM FRANCE which recently visited the United States to study prefabrication and building materials, under the auspices of the Economic Cooperation Administration, were guests of Besser Manufacturing Co., Alpena, Mich., for one day of their visit in the U. S. The Besser company conducted the French group on a tour of two Long Island concrete block plants, the Diyorgi and Picone Brothers plants, where they studied plant operations.

Another feature of the Long Island trip was a visit to the U. S. Merchant Marine Academy at Kings Point on the former Walter P. Chrysler estate where they saw many outstanding examples of concrete masonry structures. These buildings were erected in the early part of World War II and the concrete block, exposed on the interior and exterior, are an impressive example of what can be done with concrete masonry.

Damage Suit Filed

CONCRETE MATERIALS AND CONSTRUCTION CO., Cedar Rapids, Iowa, is a defendant in a $20,000 damage suit filed by adjacent property owners who charge that the company has used excessive explosives in its quarrying operations, causing rock to be thrown on their property. The plaintiffs contend that farm buildings, livestock and poultry have been damaged by flying rock and that their own health has been impaired by dust and smoke from the quarry.



French Technical Mission and Besser representatives visit U. S. Merchant Marine Academy to study concrete masonry structures. Left to right, Mr. Cointe, engineer; Mr. Bryan, advertising manager of Besser; Mr. Gimler, engineer; Mr. Franklin, Besser; Mr. Guillon, chief of mission and architectural engineer and Besser agent in France; Mr. Pux, engineer; Mr. Dolbeau, engineer; Mr. Kolas, Besser; Mr. Feigs, engineer; Mr. Hubert, engineer; Mr. Gribble, interpreter; Mr. Durel, engineer

Speeding Up Curing Cycle with Steam Generator

THE BESTONE CONCRETE CORP. block plant near Chardon, Ohio, about 30 miles southeast of Cleveland, is one of the most modern concrete block plants in the country. Fourteen men operate the plant which can produce 30,000 8-in. block in a 24-hr. period, and often makes over 11,000 per 8-hr. day. William N. Clark, well-known to the industry, is plant manager.

The sand and gravel aggregate for the block plant is supplied by the Walter C. Best Corp. plant on the 300-acre property where the plant is located. The Best operations produce about 1000 tons of 99.7 percent silica sand and aggregate per day, which is washed, screened and graded. It is also sold to steel plants, chemical plants and foundries in the area.

The block plant building was laid out for efficient production with all operations under cover, enabling production to continue the year around. A paved storage area large enough to store 750,000 block is attached to the plant. Materials are delivered to the storage bin elevators on a truck ramp. The storage bins are enclosed in aluminum sheeting.

Steam Generator

The plant produces light and heavy block, and all types of special shaped concrete block. This is the first block plant in the country to cure its block with steam supplied by a Vapor-Clarkson steam generator.

There are six kilns used in the process, each one 12 ft. wide, 3 ft. high and 80 ft. long, with counterbalanced aluminum doors on each end, a design which permits older block to be removed first. The kiln walls are made of 8-in. block, with concrete slab roofs.

Two hours are required to fill each kiln with 44 racks holding 3168 8-in. block. After this time live steam supplied by the generator at 150 p.s.i. pressure is turned on at once to bring the kiln temperature up to 180 deg. F. quickly. This machine develops 200-p.s.i. steam pressure in two minutes from cold water and produces 3500 lb. of steam an hour, a volume sufficient to hold three kilns at the 180 deg. F. temperature for the sustained curing periods. When fully on, the generator uses 30 gal. of No. 2 fuel oil per hour. However, the machine cycles on and off automatically, making steam only when needed.

Top: W. N. Clark, left, looking over the block as they are removed from the block machine and placed in the 72 block rack

Bottom: Left to right are William N. Clark, Walter Best, president of the company, and Clarence Ives looking over the generator which supplies steam for curing

A 2½-in. steam line passes through each kiln; off this line is a ¾-in. line running along the upper part of the kiln wall, with an elbow opening about 3 ft. from the front door and an opening at the end of the 50-ft. ¾-in. pipe in the kiln. There is a valve on the line to control the steam in each kiln.

The Vapor-Clarkson steam generator is said to operate at 80 percent efficiency. One 5-hp. 220-volt a-c motor drives the water pump, fuel pump, blower and transformer to operate the unit. Once started, automatic controls take over, causing the machine to maintain the predetermined steam pressure. An electric eye is incorporated in the machine to turn off the unit if the fire does not light properly. The generator was originally designed to supply steam in diesel-electric locomotives. It is made by Vapor Heating Corp., Chicago, Ill., and supplied by Littleford Bros., Inc.

The 180-deg. F. temperature is held for six hours, then the steam is turned off, and the balance of the curing period serves as a soaking period which may vary between four and 16 hr. according to production demands.

View of the Bestone Concrete Corp. block plant near Chardon, Ohio

Escanaba Concrete Corp. promotes year-round operation in Michigan with radio advertising

Over-all view of Escanaba Concrete Corp. plant showing truck hopper (left) for delivery of sand and gravel, inclined conveyor belt, and a 3-cu. yd. truck mixer being loaded under the two-stop plant

Producing Cold Weather Concrete

WHEN ESCANABA CONCRETE CORP., Escanaba, Mich., started merchandising ready-mixed concrete, this form of delivery was an entirely new concept to the area. But in less than a year, after customers realized what scientific, controlled batching meant in durability, placeability and lowered costs, ready-mixed concrete was widely accepted.

Winter Concreting

Over a 12-month period, temperatures in this area range from a high of 95 deg. F. to a low of 30 deg. below zero. During cold months, sand and aggregates must be heated so that they will flow from the overhead bins to the weigh batchers. All heat is applied to the aggregates and not to the mixing water. The storage tank for mixing water is located just above a Lima stoker-fired boiler that provides steam for aggregate and sand heating, with the result that water is several degrees warmer than atmospheric temperature.

By heating aggregate only, batches leave the plant at temperatures of 70 to 90 deg. F., depending on prevailing outside temperature. According to H. R. Hitchings, president and manager, any greater degree of heat in a batch of concrete while still in the body of a mixer truck would be dangerous from the standpoint of a possible preset.

When concrete is placed during cold weather, calcium chloride is added in the proportion of 2 to 4 percent, depending on cement content. Even when the prevailing temperature is only as low as 49 deg. F., a small percent of this additive is placed in the mix for such jobs as sidewalks as it is easier to trowel and saves several hours of labor. Calcium chloride is added only at the request of the customer.

Sand and gravel come from the Bichler Bros. plant located 100 yd. from the concrete plant. These materials are trucked over and dumped to an 8-cu. yd. ground-level hopper that feeds a 24-in. conveyor belt on 120-ft. centers. This conveyor belt discharges sand and gravel to overhead storage bins of 60 cu. yd. total capacity. Bulk cement, delivered by rail, is elevated to a 250-bbl. overhead storage tank by the usual screw conveyor, bucket elevator method. Overflow from the first storage tank goes to an auxiliary 450-bbl. tank at ground level.

Two-Stop Plant

This is a two-stop plant with cement being charged to the drum mixer and water added to the truck tank at the first stop and sand and gravel charged to the mixing drum at the second stop. Both the cement weigh batcher and the sand and gravel weigh batcher are of Butler Bin Co. manufacture, as are all storage bins and hoppers in the plant.

Escanaba Concrete Corp. operates seven drum-type 3-cu. yd. mixer trucks; four are of Rex manufacture and three are of Jaeger. The latest truck chassis to be purchased to carry a mixer body is a KB International; the remaining six trucks are Studebaker and General Motors.

Radio Advertising

The merchandising program of this corporation is carried almost completely through radio, as experience has proved this to be the best medium for advertising in this area. Two 1-minute spot announcements follow two news broadcasts six days a week. These news broadcasts are at 12 noon and 6:30 p.m. over the local radio station. A small amount of newspaper advertising is carried on, some direct mail advertising and such items as calendars with the company imprint are distributed each year.

Officers of the corporation are H. R. Hitchings, president and manager; David LaCosse, vice-president; and George Bergman, secretary-treasurer.

Close-up of hopper for receiving aggregates, which are carried to batching plant by inclined conveyor

Modern office of Joseph M. Ripley, Jacksonville, Fla., shows off various combinations of concrete masonry units to prospective buyers

Job delivery efficiency increased by use of platform-type truck dump bodies

PROMOTING SALES THROUGH DEMONSTRATION

WHEN JOSEPH M. RIPLEY of Jacksonville, Fla., entered the concrete block business a few years ago, a considerable number of small plants were springing up in the area. In view of this, Mr. Ripley's friends predicted that he would go bankrupt and that he had best stick to his old line as a building contractor.

Instead of failing Mr. Ripley sold almost a quarter million dollars worth of concrete building units the second year of operation, and so far this year his sales have reached $460,000. It is estimated that 70 percent of all concrete products used in this territory are bought from Mr. Ripley. He has established a modern plant in South Jacksonville and has a fleet of 16 delivery trucks, each with 8- x 20-ft. bodies that handle 720 block per load.

The present plant is located on a narrow strip of ground that is a city block in length and parallels the Florida East Coast railroad. To separate his holdings from adjoining property, Mr. Ripley has erected a long, high wall of concrete block. This wall is one of the two dominant features of the operation for it has been put to work as a sales promoter. Some sections are painted different colors in an attractive manner using the various kinds of cement paints that are sold by his company.

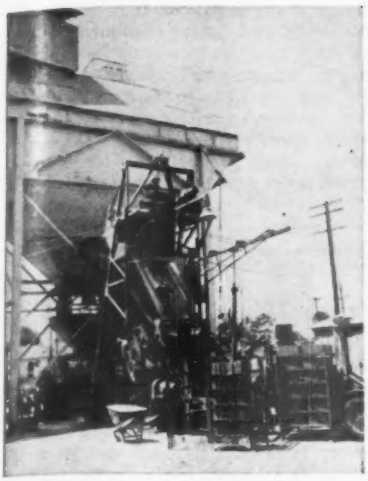
The second dominant feature of the operation is the attractive office alongside the plant and with it the warehouse, for the company carries a stock of the various items that a concrete contractor or builder can use such as sash, mortar-mix, etc. The yard is paved with 75,000 sq. ft. of reinforced concrete.

Steel bins over the batching equipment are filled by an 18-in. belt conveyor running from the open storage bins for aggregate at the right

Block Delivery

For handling the block from the Besser Vibrapac, seven Towmotor lift trucks are used. Sixteen trucks are used to deliver the block and when loaded hold ten cubes of block (72 block per cube). There are 13 Mack trucks, one International, one Dodge, and one White, which are all kept in top condition and painted suitably with the company name and address. The Mack trucks are equipped with a special body design invented by the owner and manufactured by Daybrook Hydraulic Corp. The body is a combination platform-dump and has a Daybrook 9-HD speed-lift hoist of 27,000-lb. capacity. Deliveries are made in Jacksonville on the basis of 2c per block.

At present, curing is done in the open but plans are afoot to construct steam curing rooms. From 100,000 to 300,000 block are kept on hand in the yard at all times and for a period of three weeks when possible. All block sold are certified by the Pittsburgh Testing Laboratories and are designed to withstand 1000 p.s.i. compressive strengths at 28 days. Sand, gravel and gray slag are used for aggregate, and some experimental block are being made with Superock, lightweight expanded slag from the Birmingham, Ala., area. The aggregates arrive at the plant in car lots and are unloaded by a Barber-Greene and a Farquhar unloader to a four-compartment, open-storage bin. Each compartment is separated from the other by a concrete block retaining wall. An 18-in. belt



The batching bin, mixer and block machine assembly can turn out 13,000 8-in. units per day

on 350-ft. centers running in a reclaiming tunnel with gravity-type gates delivers the material to Heltzel steel bins over the batching equipment. The conveyor, batcher, scales, etc., all were supplied by Heltzel. In the open storage piles there is room for 300 tons of sand, 200 tons of gravel, and 200 tons of slag. The three-compartment bins over the Besser machine hold additional two car loads each. There is room for 700 bbl. of bulk cement that is shipped from the Clinchfield, Ga., plant of the Pennsylvania-Dixie Cement Corp. The bulk cement bin is equipped with a Syntron vibrator.

The bottom of the 50-cu. yd. Besser mixers are a few feet above ground line and concrete is delivered to the hopper over the block machine by a short, inclined skip. Later, Mr. Ripley expects to house this entire section.

Handling of Pallets

Pallets are handled efficiently. The green block, after standing outside for 24 hr., are cubed, 72 to the cube (four block high) and a fork-lift truck places them in the storage yard.

The steel pallets for the block machine are then cleaned and piled on a small steel rack until a pile a foot or more in height is built up, then a fork truck lifts the pile of pallets and deposits them on a roller bearing conveyor near the rear of the block machine. There an attendant puts the plates into the back of the machine, oiling them first with a water soluble oil. The roller conveyor can hold several stacks of pallets and its use enables the operator to bring the pieces closer to the place of use without undue effort. One Besser has front pallet feed and pallets are left on racks.

The plant can make 13,000 standard 8-in. block per day, 70,000 brick or 13,000 partition tile. In all there are 66 different sizes and shapes manufactured. The plant also has a 32-cu. ft. mixer for making slump brick, footings and stepping stones.

DRYING BLOCK ON THE JOB

NATIONAL CONCRETE MASONRY ASSOCIATION has obtained for its members copies of the memorandum prepared by the Portland Cement Association concerning specification requirements and construction techniques which were used for the concrete masonry walls in the Portland Cement Association's newly remodeled office building in Chicago, Ill., and in the new Research and Development Laboratories in Skokie, Ill.

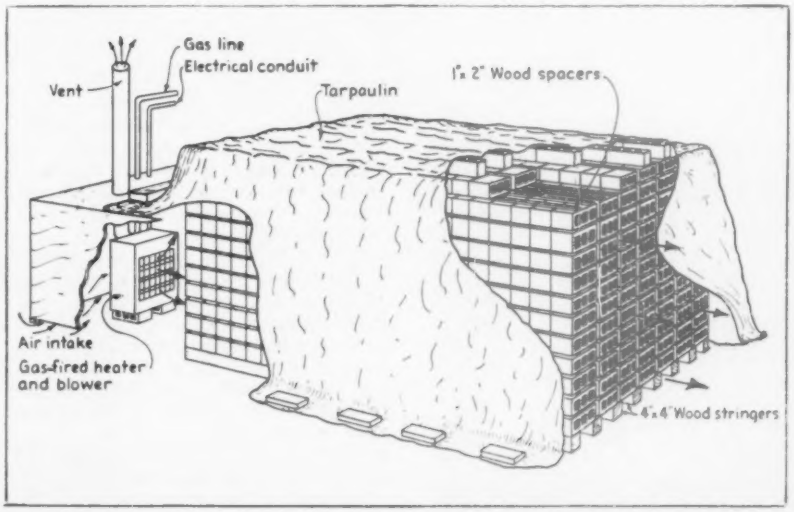
It was stated that concrete masonry walls were selected because of the interesting surface texture, the variety of masonry patterns available, the acoustical properties of the open texture block and the pleasing colors of the painted walls. Very rigid specifications were required. The concrete block used were the commercial grade of all types of lightweight and heavyweight block manufactured in the greater Chicago area. The architect's specifications called for block with "medium rough texture" with the intent that such surface would retain the interesting texture characteristics and acoustical values after it was covered with portland cement paint.

Another specification requirement stated "in addition to curing treatment at the plant, all concrete masonry units be subjected to the following drying operation on the premises. Upon delivery, all units shall be stored and seasoned inside of the building for at least one week before using, as follows: Units shall be stacked in piles not over eight units high, using 1- x 2-in. wood strips between courses with units spaced 1 in. apart laterally. Piles shall not be over 6 ft. wide nor more than 16 ft. long." These dimensions were more or less arbitrary and were influenced by the type of drying facilities.

In the later stages of construction, because of space limitations, it was found necessary to store and dry block out-of-doors. Protection against the weather was obtained by a waterproof tarpaulin cover over a light framework. Drying both indoors and outside was accomplished by means of a gas burning heater and blower. Hollow units were stacked on their sides to permit air to be blown through the cores. The bottom rows of units were placed on 4- x 4-in. stringers to permit free flow of air under the piles. The method of drying proved so effective that the block would usually be dried to 20 percent or less of their maximum absorption in a 48-hr. period. This degree of dryness was desirable to reduce, to a practical minimum, danger of shrinkage in the finished walls,

Another requirement was that sample panels be built and kept on the premises. These panels, 32 in. high and 40 in. long, demonstrated the exact masonry patterns, wall textures, types of mortar joints and nature of painted surfaces required. Examination of these panels was a mandatory requirement of the specifications. Products manufacturers, before submitting bids, were requested to inspect the panels and give assurance that they could supply block of the sizes, quality and texture of those in the panels. There were also painting specifications to be followed. Most of the masonry walls were given one coat of portland cement base paint.

Another interesting feature is that vertical control points were placed at all intersecting concrete masonry walls, at all interior corners and in straight walls more than 30 ft. in length. All walls in the project were non-bearing.



Stockpile arrangement illustrating how block were stacked and artificially dried on the job by gas-fired unit heater and blower

NEW MACHINERY

Pneumatic Tire Lift Truck

THE BUDA CO., 15425 Commercial Ave., Harvey, Ill., has supplemented its line of fork lift trucks in capacities from 2000 to 6000 lb., with two new pneumatic tire models, FPB20-24 and FPB20-15. Rated at 24- and 15-in. load centers, features of the trucks are reported to include: carriage mounted on patented adjustable side thrust rollers; extra-strength and self-aligning mast; single lever two speed forward and two speed reverse gear shift; and quick change heavy-duty clutch. Powered by a 4-cylinder, 61-cu. in. displacement engine, the models are available in five standard masts with a lift of 72, 84, 108, 114 and 120 in.

Pneumatic tire fork lift truck

Concrete Trailer

THE SERIOUS PROBLEM of transporting incinerators and other concrete-slab products without damage has been solved with the unique van pictured herewith by Currier's of Denver, Colorado.

Transporting concrete products

Currier's, a specialty firm manufacturing concrete drain tile, and concrete-slab backyard incinerators, found the transportation of its products which are fitted together tightly to form ornamental and useful adjuncts to modern homes, a serious problem, inasmuch as carrying them in flat-bed trucks, or even stacked in crates, usually resulted in some damage. For example, a group of slabs, tightly crated and placed in a stake truck for delivery, would invariably jolt against each other in transit, with the result that several slabs would arrive broken and require replacement.

After two or three years of experimentation, the Currier firm hit upon the solution with the novel trailer design shown herewith—a 2-wheel, semi-trailer, 12 ft. long, 6 ft. wide, and 52 in. high, which will carry five complete incinerators broken down into component parts.

The trailer unit closely resembles the type of body normally used by glass firms for transporting large-size panes of glass. Instead, however, the Currier trailer carries an extremely heavy load of concrete slabs safely, compactly and with absolutely no breakage. The secret, as shown in the rear view, is the use of "spring steel clamps" mounted down each side of the wedge-shaped body to hold the comparatively-delicate or brittle concrete slabs in place. The spring steel clamps consist of a 3-ft. length of automobile spring steel, similar to a leaf removed from an automobile spring, which is bolted securely to a bowed metal rod at the bottom, in front of each row of slabs. The top of this is secured in place by means of cross members, punched with holes, spaced an inch apart, which makes it possible to force the rod back, until it cannot be pushed farther, when a bolt is inserted through the top of the rod and into one of the holes to hold the slabs firmly in place. Applied spring tension, with the added power of the spring steel as the slabs "settle" in transit, holds each securely in place, and so tightly that they cannot jolt or vibrate into one another, even over the bumpiest road.

The body of the trailer consists of an H-iron frame, with nine cross-members, and strong angle-iron supports down the center, to hold the often ponderous weight of large numbers of concrete slabs. As shown, the unit is unusually graceful, and because of the appearance of the arched rods, which keep the spring leaves clamped tightly against the face of the slabs, it creates a large amount of attention, when moving over the streets of Denver.

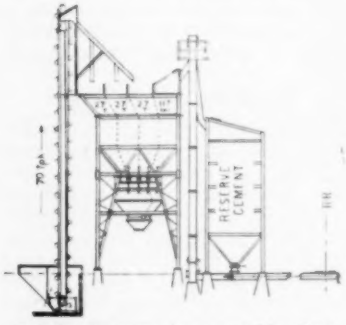
The Currier company reports that it can trace many of its incinerator and drain-slab installations to curiosity stemming from merely seeing the unit on the street, and success with its use has completely done away with the breakage and other damage, which formerly made trans-shipment an expensive proposition. Other firms which must move ponderous, but brittle products from place to place, such as ceramics manufacturers, have shown much interest in the new-trailer design.

Truck Mixer Unit

TRANSMISSION AND GEAR CO., 10427 Haggerty, Dearborn, Mich., has begun production of the Transomixer, a new truck mixer unit, featuring a leak-proof seal between hopper and mixing drum. It is said that all seal wear is eliminated, making the maintenance and replacement formerly required on this part unnecessary. The new unit is equipped with the Transo direct drive which eliminates sprockets, drive chains and ring gears, and is reported to result in a saving of from 800- to 1600-lb. dead weight. Both 3½- and 4½-cu. yd. sizes are in production.

Combination Bin Plant

L. K. LIPPERT CO., London, Ohio, has added the "3/27/117" aggregate-cement bin plant to its bulk cement bin equipment and handling line. Other sizes of this bin-plant permit proportioning of materials as desired. The main bin and bin top are assembled before shipment and are provided with a roofed-sealed cement compartment and two or three aggregate compartments, with weigh-batching equipment to suit various needs.



Details of aggregate-cement bin plant

Concrete Block Admix

IT WAS RECENTLY reported in the *Chemical & Engineering News*, that a denser, stronger and more uniform concrete block and brick may be obtained by addition to the mix of small amounts of a surface-active agent, trade-named Santomerse S. It is a liquid wetting-agent and is said to permit the use of less water by increasing its efficiency, thus producing a so-called "dry" concrete of greater strength. In addition, it is said to result in improved plasticity, cleaner equipment, lighter-colored products and better dispersion of cement.

Another Leader ★ IN THE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!

Mr. Robert Coe, General Manager and Mr. W. A. Rodgers, Sales Manager, of Basic Construction Material Co.

Stock pile of Vibrapac Block at the Basic Plant in Chillicothe, Ohio.

At the time *Basic Construction Material Company* of Chillicothe, Ohio decided to manufacture concrete block, Mr. W. A. Rodgers, Sales Manager, made this statement:

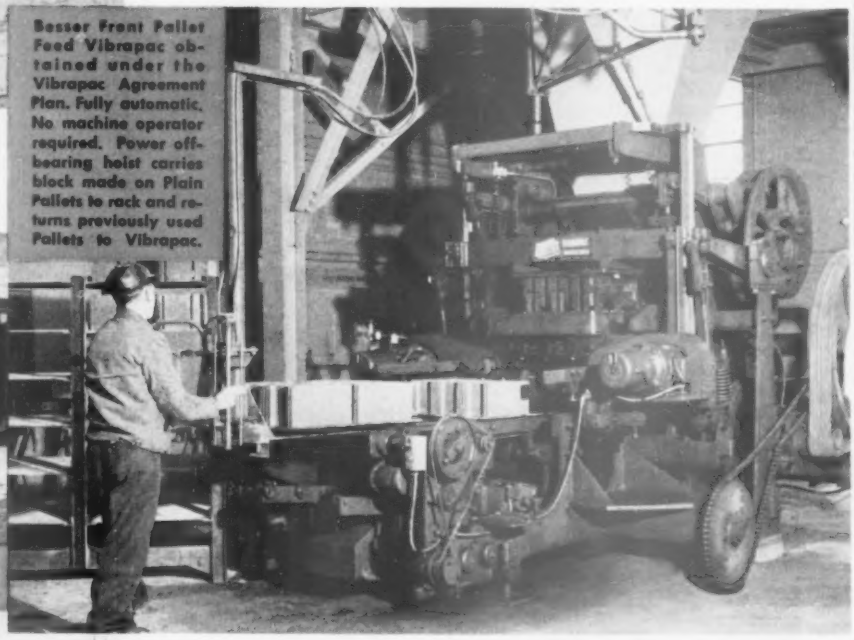
> *"We decided to install Besser equipment as we felt we should have the BEST if we were to manufacture concrete block."*

The Basic plant is now equipped with the latest Front Pallet Feed Super Vibrapac and 50 cu. ft. Besser Batch Mixer. Maximum production is maintained day in and day out with no down time as Besser equipment will stand long hours of continuous high production.

Ask Besser today how you can improve your concrete products plant operation.

BESSER MANUFACTURING CO., Alpena, Michigan, U. S. A.

Complete Equipment for Concrete Products Plants



Besser Front Pallet Feed Vibrapac obtained under the Vibrapac Agreement Plan. Fully automatic. No machine operator required. Power off-bearing hoist carries block made on Plain Pallets to rack and returns previously used Pallets to Vibrapac.

...sic has found handling block is easier and faster ...y using a Besser Stationary Block Cuber.

One of many homes in the Chillicothe area built with Vibrapac Block furnished by Basic.

Soffit Block for Floors and Roofs. Ideal for radiant heat installation. Provide surface of maximum acoustical and insulation value. Low initial cost. Low maintenance. Write Besser for information, how to make Soffit Block on your Vibrapac to increase your block sales on every job.

★ This is the 90th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapac machines.

BESSER

ATCH IXERS | SKIP LOADERS | BLOCK & BRICK CUBERS | SUPER VIBRAPAC | SINTERING PLANTS | ACROW CENTERS | ROOF TILE MACHINE

Lift truck with new wheel design

Redesigned Lift Truck

HYSTER CO., 2905 N. E. Clackamas St., Portland, Ore., has re-designed the wheel on the Model YT-40, 4000-lb. capacity fork lift truck. All these trucks are now being equipped with dual wheels instead of a single wheel on the steering trunnion, and present single-wheel models may be converted to dual wheels, if desired. The new design also has reduced the gear ratio in the steering mechanism from 31:1, to 20.7:7, thus requiring seven turns of the steering wheel instead of the 10.3 formerly required to swing the trunnion 120 deg.

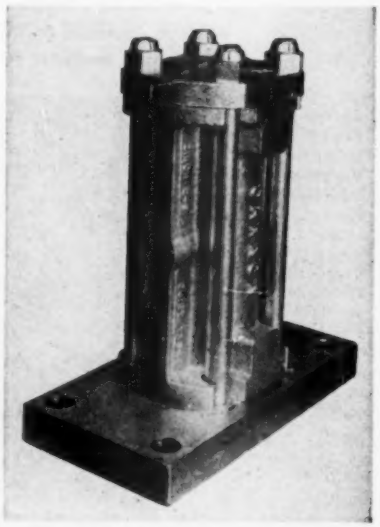
Concrete Paint

A NEW PAINT which can be sprayed, brushed or rolled on in two coats has been developed for sealing concrete and cinder block walls against penetrating dampness and also to serve as a protective and decorative outer coating, according to a recent news release by Bakelite Co., a division of Union Carbide and Carbon Corp., New York, N. Y. The new paint is based on Bakelite styrene emulsion and is said to close up moisture-admitting pores in the walls and to dry to a tough, long-wearing finish. In many housing project units, the coating has been employed to protect interior wall decoration from dampness while decorating exterior walls. The coating is available in a variety of colors.

Concrete-sealing paint serves as protective and decorative coating

Vibrator Line

CANNON VIBRATOR CO., 1111 Power Ave., Cleveland 14, Ohio, has announced a line of Style EM "quiet-type" vibrators which can be furnished in 1¼- to 4-in. piston sizes. Ranging in weight from 9 to 140 lb., they are said to be useful for the prevention of arching, hanging-up and sticking to bins, hoppers, chutes, etc. The company states that the vibrators are quiet, because air-cushioned impact prevents all metal-to-metal pounding.



Vibrators in 1¼- to 4-in. piston sizes

Automotive Battery

THE ELECTRIC STORAGE BATTERY CO., 23-31 W. 43rd St., New York, N. Y., has announced the development of an automotive battery, the Exide Ultra Start, said to give longer service than previous models. The company reports that four new developments have been used in the battery: Silvium, a corrosion resisting grid metal; a high capacity active material; a low specific gravity electrolyte; and a Pormax plastic separator.

Gasoline Fork Trucks

THE YALE & TOWNE MANUFACTURING CO., 11500 Roosevelt Blvd., Philadelphia, Penn., has in production a series of gasoline fork trucks specifically designed for operation in and around highway motor trucks and freight cars. Called the "Trucker" series, the new trucks are said to combine low weight, low over-all height and high maneuverability for operation in close quarters. In duplex models, the truck can elevate its forks 54 in. before the secondary channels rise to increase the height. Available in capacities up to 2000 lb., the Trucker is 68 in. high when the telescopic lift is collapsed.

Automotive type lift truck

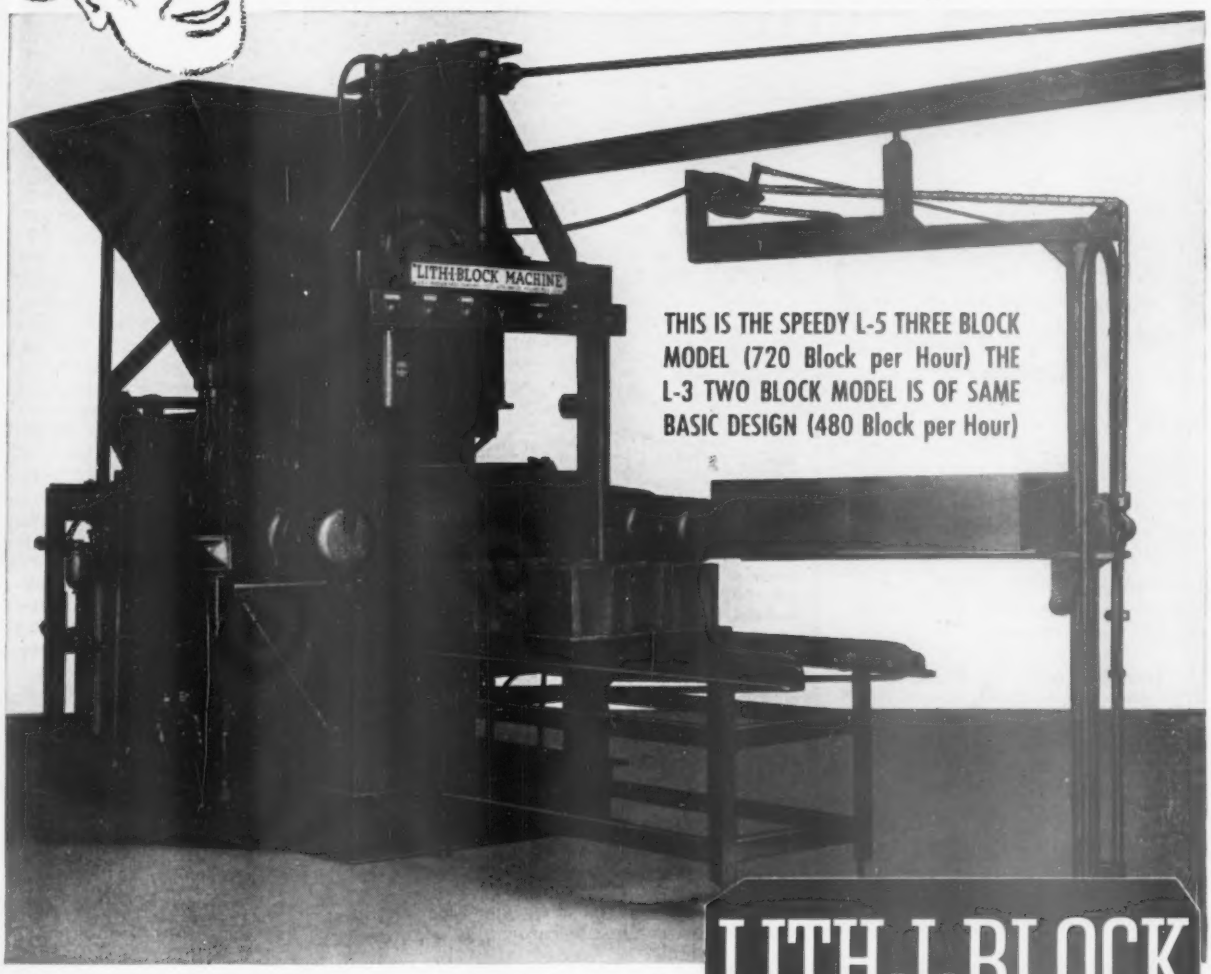
Concrete Cutting

CLIPPER MANUFACTURING CO., Kansas City, Mo., has perfected its diamond blades for the cutting of concrete. Blades are available for all types of aggregate and ages of concrete. These blades are manufactured in diameters from 8-18 in. and in thicknesses of 5/32-7/64 in. for use on any type concrete saw. The company reports that concrete containing limestone aggregate can be sliced up to 10 f.p.m. when cutting at a depth of 1 in.

Foaming and Dispersing Agent

ONYX OIL & CHEMICAL CO., Industrial Div., 190 Warren St., Jersey City 2, N. J., has developed a foaming and dispersing agent for air-entrained concrete which, it is said, does not demand laboratory accuracy in measuring the amount to be added per batch, in spite of the fact that it is a concentrate. Tests were made to determine air content in mortars treated with Foamasol. Addition of 0.005 percent Foamasol on weight of cement showed 12.7 percent air, and 0.03 percent Foamasol indicated 19.8 percent air. This foaming agent is a mixture of stable chemical ingredients, containing a sodium salt of an alkylnaphthalene sulfonic acid, which provides its foaming and dispersing action. Foamasol is supplied as a liquid concentrate, in 55-gal. containers; is compatible with acids, alkalies and hard water at all temperatures used in concrete work; and does not deteriorate in storage or show sensitivity to extremes of heat and cold. In transit-mix operations, it is recommended that Foamasol be added to the batch at the job. Typical mixes are (1) on-the-job and transit-mix concrete: five bags cement (470 lb.), 1150 lb. sand, 1510 lb. gravel, 30 gal. water, and 1 oz. Foamasol; (2) lightweight concrete: five bags cement (470 lb.), 1880 to 2350 lb. aggregate (in gradation up to ½ in.), 30 to 40 gal. water, 5 to 10 lb. calcium chloride, and ½ lb. Foamasol.

. . . Never a day lost with this money-maker



THIS IS THE SPEEDY L-5 THREE BLOCK MODEL (720 Block per Hour) THE L-3 TWO BLOCK MODEL IS OF SAME BASIC DESIGN (480 Block per Hour)

LITH-I-BLOCK

The nearest thing to perpetual motion in the block business

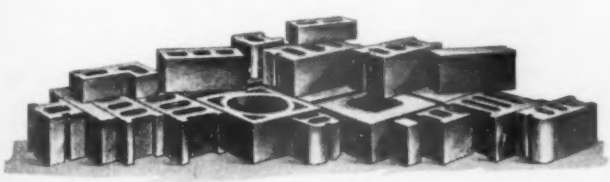
What users of Lith-I-Block machines like particularly about them is the fact that they produce . . . day after day — steadily, continually, without loss of time.

They like the open, skyscraper construction — the way it gives them easy access to all parts — the way is lets them make an adjustment or change a mold box in a jiffy . . . without slowing down production.

They find that service is no problem either. They know that parts are no farther away than the next plane departure. There is no costly break in the production cycle.

Yes, constant production. That's what it takes to make money in the block business and that's what Lith-I-Block delivers. As one of the biggest operators in the country said, "Our Lith-I-Block machines were only shut down four days last year . . . and that was due to a cement shortage, not to any fault of the machines."

Get proof of profitable Lith-I-Block performance for yourself. Write for the Lith-I-Block story and the names of nearby Lith-I-Block producers. Learn what Lith-I-Block quality and constant service can do for you.



THE LITH-I-BAR COMPANY

HOLLAND, MICHIGAN

Dept. CP 11

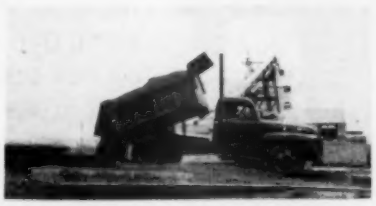
Combination Plant

(Continued from page 127)

through the first scalping screen enters a roll crusher and is reduced to minus ¾ in. Aggregate leaving the roll and jaw crushers is conveyed by a return belt and deposited on the conveyor running from the grizzly.

The sand and minus 1½-in. gravel discharged on the main belt leaving the crusher and scalping screen enters the uppermost part of the washing plant where wash water is applied at the rate of 800 g.p.m. It is then washed in a long trough, after which the material is put over a wet, three-deck Diamond vibrating screen. At this point additional high pressure well water does the final washing.

This is considered one of the best pits in the area because of the quality and gradation of the material. As already stated, it is the fourth pit Standard has opened. The original pit site is now occupied by Standard Building Material's office building and maintenance shop. One site was sold for a housing project. The washing plant occupies the third pit, where future stock piles will be stored. Standard pits are never excavated below street level. The present pit will be used eventually for residential or commercial buildings. It has never been possible to use the site before due to its hilly profile.



Dumping a load of aggregate from the company's pit into the 200-cu. yd. hopper that serves as ground storage. A horizontal feeder conveyor in an underground tunnel carries the material from the storage bins to the main conveyor in back of the truck

Stockpiled material for general sale includes 1½ in., ¾ in., ½ in., buckshot gravel, torpedo sand, concrete sand, and plaster sand. Hoppers below the screens accommodate all graded material. The storage piles cover two square blocks.

A fleet of 36 trucks handle all material deliveries. Ready-mixed concrete trucks have 4½-cu. yd. Smith mixing units. Additional trucks are rented as needed.

The curing rooms receive daylight through the glass block windows

Standard has 50 employes. One-third have been with the company for over ten years; one-fourth, 25 years. The firm was founded by Joseph Chalupa, Sr.; Joseph Chalupa, Jr., is president of Standard Building Materials Co. and vice-president of Standard Ready Mixed Concrete Co.

Concrete Fire Tests

THE NATIONAL BUREAU OF STANDARDS recently published Building Materials and Structure Report 124 on "Fire Tests of Steel Columns Protected with Siliceous Aggregate Concrete." Fire-endurance tests were conducted on four 6-in., 20-lb. H-columns having protective coverings of siliceous aggregate concrete. The concrete was 2 in. thick around the column shaft and filled the reentrant spaces. The aggregates were river gravel and crushed quartz. According to the report, the loads on three columns of magnitude as computed by a standard formula for allowable load were constant. One column sustained a double load throughout the earlier part of the test. The fire-endurance limits ranged from 2 hr. and 50 min. for a column with crushed quartz aggregate concrete to 3 hr. and 35 min. for one with gravel aggregate concrete.

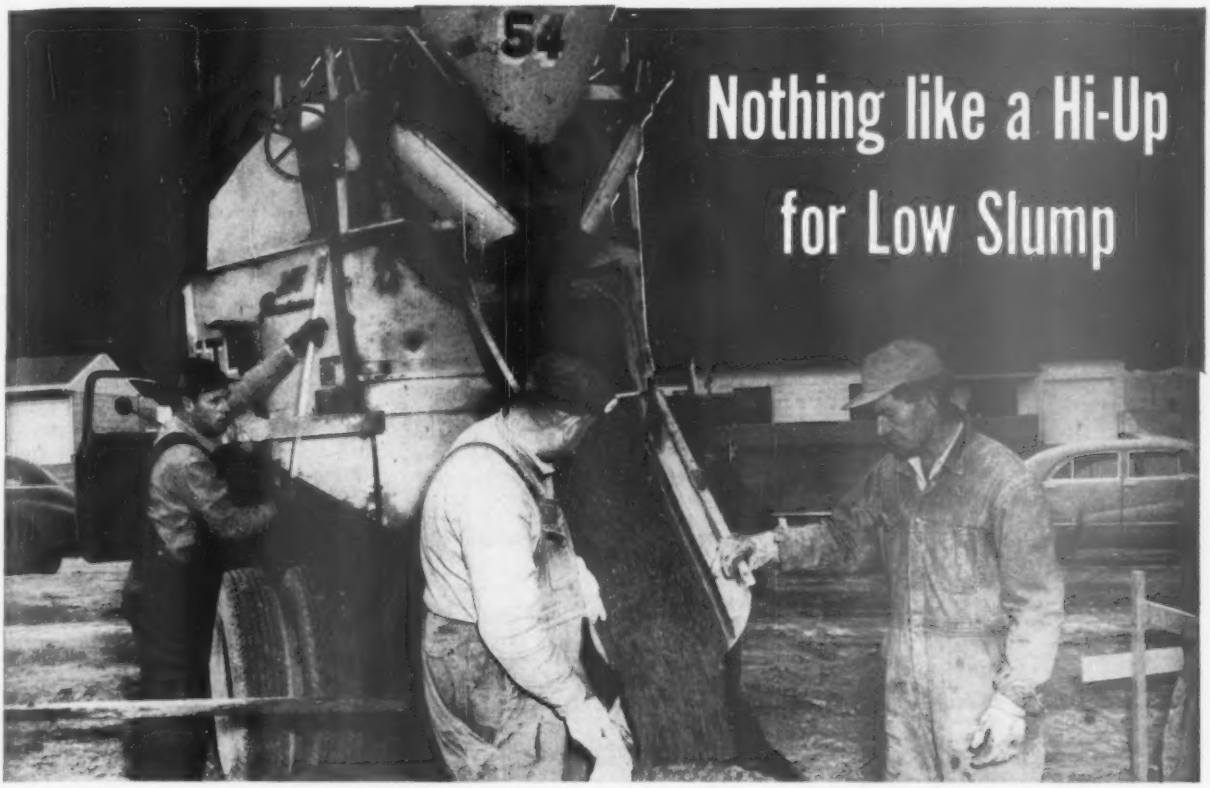
The booklet includes such information as the materials used, construction of the columns, equipment and method of testing, results of tests, and a summary and discussion of the results. Also included are several illustrations, charts and diagrams. Copies of the booklet may be obtained for $.15 per copy from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Price Relief

THE OFFICE OF PRICE STABILIZATION, through Supplementary Regulation 66 to the General Ceiling Price Regulation, acted to permit resellers of cement and producers of ready-mixed concrete to increase their ceiling prices to reflect dollars-and-cents increases in cost on cement purchased from "out of area" sources of supply. The new order became effective October 2.

The sudden expansion in defense construction and related projects in many areas exhausted local sources of supply, causing many resellers and ready-mixed concrete producers to obtain their cement from "out of area" sources. "Out of area" purchases are defined by O.P.S. as purchases from sources more distant freightwise than any source used by the resellers during the calendar year 1950.

The new regulation was designed to give relief to the resellers and concrete producers affected and, at the same time, facilitate the flow of cement to urgently needed construction.



All over the country, Worthington-Ransome Hi-Up Truck Mixers are out-performing other makes!

Photo of 4½ cu yd Worthington-Ransome Blue Brute Hi-Up Truck Mixer fleet operated by Concrete Inc., Denver, Colorado.

Photo of 5½ cu yd Worthington-Ransome Blue Brute Hi-Up Truck Mixers operated by Lattanzio Transit Mix Co., Inc., Schenectady.

Compare them on the basis of charging and discharging time . . . compare them on the basis of maintenance—

You'll find that Worthington-Ransome Blue Brute Hi-Ups score way ahead of other makes.

You'll surely want to experience results like these—

Fred D. Hoppe, vice-president, Concrete Inc., Denver, says, "Charging and unloading time is the lowest in our fleet of 26 units. We particularly like the way they discharge low and no-slump concrete. We experience less 'down time' with these machines than anything else in our fleet." Mr. Hoppe purchased *six more!*

Lou Lattanzio, Lattanzio Transit Mix, Schenectady, says of his 5½ cu yd Hi-Ups: "We are very pleased with the discharge rate even with low-slump concrete. There has been no appreciable mechanical trouble." Mr. Lattanzio "expects to standardize on Hi-Ups."

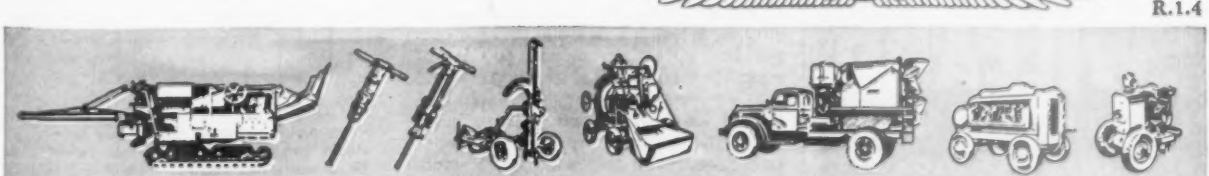
So join the growing list of Hi-Up fleets, which include Pine Hill Concrete Mix, Inc., Buffalo—over 40 Hi-Ups; Southern Materials Corp., Richmond and Norfolk—over 20; Buzby Brothers, Westville, New Jersey—over 20; Fenton Materials Co., San Diego—over 20.

See your nearby Worthington-Ransome distributor for a demonstration. Worthington Pump and Machinery Corporation, Construction Equipment Division, Dunellen, New Jersey.

BUY BLUE BRUTES

WORTHINGTON

R.1.4



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

FORUM
ON CURING CONCRETE PRODUCTS

conducted by
WILLIAM J. SHORE

Question

We have been experiencing difficulties with our steam curing system. When we steam cure, using one kiln at a time, we occasionally lose entire batches of block (2000 per kiln). These come out completely dried and are worthless.

When we attempt to use our 80-hp. boiler on three kilns simultaneously, it takes a long time to get any strength in the block, and in cold weather it becomes almost impossible to keep up with our production rate of 720 standard 8-in. units per hr.

The piping sketch (Fig. 1) shows the manner in which our steam distribution system is installed. The boiler makes steam at 10 p.s.i. and has a capacity of 80 hp. or the equivalent delivery of 2400 lb. of steam per hr.

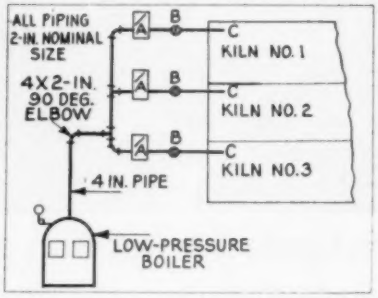


Fig. 1: Steam piping hookup that created dried-out block. (A) Steam temperature modulating valves, (B) Steam shutoff valves, (C) Plain openings in 2-in. pipe

We are unable to account for this contradictory state of affairs and would appreciate an opinion on what is wrong and what changes must be made to correct this condition.

Answer

Referring to the steam piping diagram in Fig. 1, it is noted that from the boiler a 4-in. pipe line runs to the curing kilns. At the end of this line a 4- x 2-in., 90-deg. reducing elbow is installed and all the piping from this point on is 2-in. pipe.

Because of this pipe layout, it is impossible to steam cure block in all kilns at one time. The 2-in. pipe through which all steam must pass limits the flow of steam to 1800 lb. of steam per hr., and although there is an 80-hp. steam boiler, the 2-in. restriction limits the flow of steam to only 60 boiler hp. or 1800 lb. of steam per hr. This then means 600 lb. of steam per kiln, and at this rate would require steam delivery to each kiln for at least 6 to 7 hr. before block would be brought up to the proper temperature. In cold weather it would be longer because of loss of heat from the outside of kiln walls and roof.

To correct this condition, piping must be changed as shown in Fig. 2. Remove the 4- x 2-in. elbow and replace it with a 90-deg., 4- x 4-in. elbow. Run 4-in. pipe to pipe header into a 4-in. tee. From one side of this tee run a 2-in. pipe to one kiln. On the other side of the 4-in. tee continue the 4-in. pipe to the next tee. Run 2-in. pipe to each of the remaining kilns from the remaining two outlets of this tee.

With this change in piping it becomes possible to deliver to each kiln a total of 180 boiler hp. But since the boiler is only 80 hp., it becomes possible to deliver to each of three kilns operating at one time a total of 27 hp. to each kiln. If two kilns were to operate at one time, each would receive a maximum of 40 hp. per kiln from this boiler.

The reason for ruined block when using one kiln is evident from a study of the steam piping layout in Fig. 1. As shown, each kiln is fed by a 2-in. steam pipe orifice with no restriction.

At 10 p.s.i., this opening allows a total of 60 boiler hp. or 1800 lb. of steam to enter the kiln per hr. Since on an average it requires about 2 lb. of steam per block, or 4000 lb. of steam for these 2000 block, it will be seen that block are up to their proper heat in a matter of 2.25 hr. This rapid heat rise is harmful to block.

If steam is left on for more than 2.25 hr., block temperatures will rise too high. Furthermore, if steam is lost through leaky doors, the vapor pressure in the block will exceed that of the kiln atmosphere and water will leave the block before hydration has been completed and all block will be ruined.

To correct this condition, steam admittance orifices must be reduced. On the end of each of the three 2-in. pipe entering the kilns, install one reducing coupling 2 x 1¼ in. In the 1¼-in. opening of the reducer, screw a 1¼-in. shoulder nipple. This reduces steam admission to about half the amount, and thus prevents a too rapid rise in block temperatures and should therefore eliminate all future possibility of damage to block.

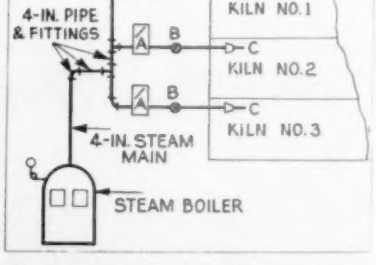


Fig. 2: Diagram showing changes to make in steam piping to secure satisfactory curing. (A) Steam temperature modulating valves, (B) Steam shutoff valves, (C) On end of 2-in. pipe, mount a 2- x 1¼-in. reducing coupling, screw 1¼-in. shoulder nipple in outlet of coupling

Washington Producers Meet

THE CONCRETE PRODUCTS Association of Washington held its 23rd annual fall meeting in Spokane, Wash., on September 15, 1951. The business session was well attended and the association's work for the year was well defined. Lakeside Gravel Co., Bellevue, Wash. became a new member of the association.

President Campbell recessed the meeting at noon, and meeting chairman Harold Lutes, Layrite Concrete Products, Spokane, arranged for a tour through the Layrite plant, where box lunches were served.

At the afternoon session of the meeting Bob Christensen, manager of Columbia Concrete Pipe Co., Ephrata, Wash., gave a talk on the Columbia Basin development, with slides of the project showing before and after comparisons.

"Spokane's Multi-Million Dollar Sewage System" was explained by Phil G. Holgren of the city engineer's office. He pointed out many of the problems unique with Spokane, and chronologically went through the development of the system. It was interesting to note that concrete pipe has been utilized more and more with each new project.

W. P. Markert, director of promotion, National Concrete Masonry Association, outlined the promotional program being carried on by the association. The major theme of the program is to educate architects and engineers in the proper use of concrete masonry. Several distinct methods of accomplishing this end are being used. Technical bulletins, brochures and promotional data are being sent to architects and engineers throughout the states, and visual aids have been adopted to illustrate the correct use of concrete masonry and to help standardize construction practices. These aids are a combination of slides and plates, which are being sent to 71 accredited schools to aid the students in acquiring a knowledge of masonry practices.

Mr. Markert relayed Mr. Copeland's request that manufacturers must accept the responsibility of delivering block which meet federal specifications. Acknowledging that areas have specific problems in regard to this specification, he pointed out the need for conforming, because good materials means satisfactory buildings and satisfied users.

The National Concrete Masonry Association's testing program was outlined and Mr. Markert explained that results of mixing, control joint, and sound transmission tests would soon be released. In addition, the members of the Washington association took the opportunity to discuss many of their problems.

E. N. Duncan, Western development agent for the Great Northern railroad, predicted the future of the Columbia Basin. As a point of inter-

est to the members he stated anticipated population increases for specific cities in the basin, which for practicable purposes can be reported as from 200 to 2000 percent in the case of some of the smaller towns. Mr. Duncan pointed out the significance of this increase to the building trades. It means additional buildings of all types to house the business and living requirements which will become a part of the basin.

R. E. Tobin, Spokane representative of the Portland Cement Association, gave a colored slide lecture on P.C.A.'s new offices in Chicago.

The meeting was followed by a cocktail hour and dinner for the members and their wives. After-dinner speaker Edward F. Harris, Spokane Taxpayer's Association, spoke on our tax structure in his talk "Can We Save Our Republic?" He stressed the importance of keeping taxes at the local level so that people can take and keep an interest in government. He gave a comparison of present and past tax composition, revealing that sources of revenue, at present, are in an inverted percentage between local, state and federal governments as compared with the structure prior to 1932, wherein the emphasis was on local taxes. The damage of the present structure was said to be breeding socialism via the Social Security route because taxation was beyond the local level.

Expanded Shale

THE FEATHERLITE CORP., Dallas, Texas, producer of an expanded shale aggregate (Featherlite) has contracted to furnish approximately 20,000 cu. yd. of its product for the structural concrete work in the 40-story Republic Bank building in Dallas, scheduled for completion in 1953. The aggregate, produced in Palo Pinto county, Texas, from Strawn shale, will be used for structural concrete, fireproofing of supporting members and concrete fill over structural concrete, according to Alex T. Mickle, executive vice-president of The Featherlite Corp.

Mr. Mickle stated that two years ago, there was not one expanded shale aggregate structural concrete building in the Dallas-Fort Worth area, but that today there are no less than a dozen multiple-story structures already completed or under construction for which expanded shale aggregate has been specified. In addition, he added, the demand for expanded shale aggregate has spread over Texas and throughout the Southwest.

The Featherlite Corp., organized in October, 1946, was said to be the first company to produce expanded shale aggregate south of the Mason-Dixon Line. The company was organized by Jack Frost, Texas oilman, rancher and industrialist, who is president of the firm. Plant capacity has been more than tripled since the start of operations.

Great Britain Active In Concrete Research

SEVERAL UNIVERSITIES IN GREAT BRITIAN are now actively engaged in various phases of concrete research. At King's College, University of Durham, Newcastle, research is being conducted on the effects of the addition to concrete of air-entraining agents and mineral matter passing B.S.200 sieve. In this connection a suitable air-entraining agent had to be discovered and a means of measuring the air content of fresh concrete devised. After trial tests with a number of admixtures, Belloid (N. W.) was finally adopted. The method used for measuring air content is based on measuring the change in volume of air in the mix with a known change in pressure.

At the University of Leeds work is being done to determine the distribution of bond stress in prestressed concrete members, and at the same time a number of creep and shrinkage columns have been cast to determine losses due to creep and shrinkage to be allowed for in calculations. Research has also been carried on there on the subject of the strength of reinforced concrete beams in shear, with the object of determining an expression which will give the ultimate strength of any reinforced concrete beam in shear for varying percentages of tension and compression reinforcements, for any ratio of length to depth, for any type of shear reinforcement and for any strength of concrete.

At Imperial College, University of London, research is being carried out on the ultimate load theory and its application to the design of bonded and end-anchored prestressed concrete beams and to ordinary reinforced concrete beams in regard to bending and shear. Electrical resistance strain gauges as well as optical strain gauges are being used to determine distribution of strain. Research is also being conducted on the properties of concrete made with expanding cement.

At Queen Mary College investigations have been completed on the effect of two wetting agents on strength and workability tests of concrete and on stress measurement by magnetostriction. This investigation was conducted on two commercial products—one non-ionic and the other anionic—using concrete mixes suitable for vibration. The anionic agent had a more pronounced effect on workability and an even greater effect in decreasing strength. New research to test the possibility of using beams made with medium strength concrete unbonded post-tensioned steel has been started.

•

EASTERN SHORE CONCRETE PRODUCTS CO., Centreville, Md., is now in full production at the former location of Centreville Block Co. The plant produces modular block in 4-, 8- and 12-in. sizes, in addition to corner block.

Missouri and Kansas Manufacturers Meet

MO-KAN CONCRETE PRODUCTS Association, Kansas City, Mo., was host to visiting products manufacturers from Missouri and Kansas at a one day regional meeting October 10, 1951. Fifty people were present for a program packed with information which ran the full gamut of operations, from plant production to sales promotion.

George W. Kulhavy (Carter-Waters Corp.), vice-president of the association presided over the afternoon meeting and George W. Goelitzer (Cinder Concrete Products, Inc.), president of the Mo-Kan group, was in charge of the evening program.

Earl Peterson, secretary-treasurer, Ideal Cement Stone Co., Omaha, Neb., reported on the successful operation of association programs in Nebraska where he heads the local Omaha group and is a past president of the 30-year old Nebraska Concrete Products Association. Cooperation with local organizations and professionals in the building industry were specifically cited as being helpful in securing business as well as the means of removing any handicaps suffered by state or local restrictions. He especially endorsed joint advertising efforts of association and members aimed at specific objectives. For a stronger appeal to the farm market, he recommended association exhibits at state fairs and for wider recognition, similar activities at local building shows.

"Spotlighting the Industry" was the subject of an address accompanied by a demonstration and slides by Carl A. Menzel, manager, Housing and Cement Products Bureau, Portland Cement Association, Chicago, Ill. The slides showed the use of concrete in the Skokie laboratory and the remodeling program at the general office building of P.C.A. in Chicago. He described the planning which preceded the use of concrete masonry units and the attention paid to details such as moisture control, superior workmanship, and finally the beauty of the patterns and the striking use of color with cement base paints. Augmenting a discussion of curing and drying research, Mr. Menzel demonstrated a new method for determining relative humidity.

Mr. Menzel then described sales promotion aids for selling concrete masonry in the home field. He predicted that 1951 would be the second best year in the volume of house construction, exceeded only by the all time high record of last year. He expected a continuation in 1952 with no appreciable drop but even if the volume fell to 850,000 units, the demand for materials would still be considerable. Shortages of certain basic materials offer a challenge to wider use of concrete with its easy availability and ready adaptability to varying construction needs.

M. N. Penny, who operates a concrete block and ready-mixed concrete plant at Lawrence, Kan., presented a selected group of colored slides, which with his description of flood relief and rescue efforts in his home city provided a graphic picture of the 1951 flood disaster.

At the evening dinner, association president Goelitzer introduced guests, told the story of the Mo-Kan Association and its objectives, and offered the services of the association throughout the area as they might be useful.

The banquet speaker, R. E. Copeland, director of engineering, National Concrete Masonry Association, gave his listeners a practical pattern for plant operations and marketing problems. He established himself as an advocate of quality products together with increased efficiency in good housekeeping and plant production. He made a strong point of penny-wise efforts to effect savings in manufacture that were insignificant in the light of laid-in-the-wall costs. He justified increased manufacturing costs where quality gains were made. He called attention to the wider acceptance of masonry units in schools, churches, office and public buildings and urged manufacturers to measure up in every way to the increased quality responsibilities that fall upon both maker and user.

He devoted much of his discussion to problems of curing and moisture and what may reasonably be expected in the future as a result of studies now being made. He mentioned the varieties of aggregates in general use and foresaw the need of small plant laboratories for better control in the use of aggregates.

Mixing problems were discussed as they affect the texture of units and curing and drying methods should follow long recognized practices in which attention to details should not be overlooked. He recognized a great opportunity in the industry to improve safety methods. In answer to request for his comments on the demands for uniformity in providing modular sized units, he suggested that local conditions were a deciding factor but that where the demand was sufficiently strong the results appeared to be highly satisfactory. He mentioned the savings in cubic yardage of concrete over an extended period as being an advantage.

Masonry Expansion

TEXAS LIGHTWEIGHT AGGREGATE CO., Dallas, Texas, recently expanded its business by the purchase of Louisiana Lightweight Aggregate Co., Alexandria, La., Acme Cement Products Co., Natchitoches, La., and Lalite Blox, Inc., Shreveport, La. The Alexandria plant processes Haydite, and the other two plants produce lightweight masonry units. The company, which was founded five years ago, also operates Haydite plants at Eastland, Rosenberg and Stafford, Texas, and concrete plants at Dallas, Fort Worth, Corpus Christi and Pharr, Texas.